POTATO AUSTRALIA

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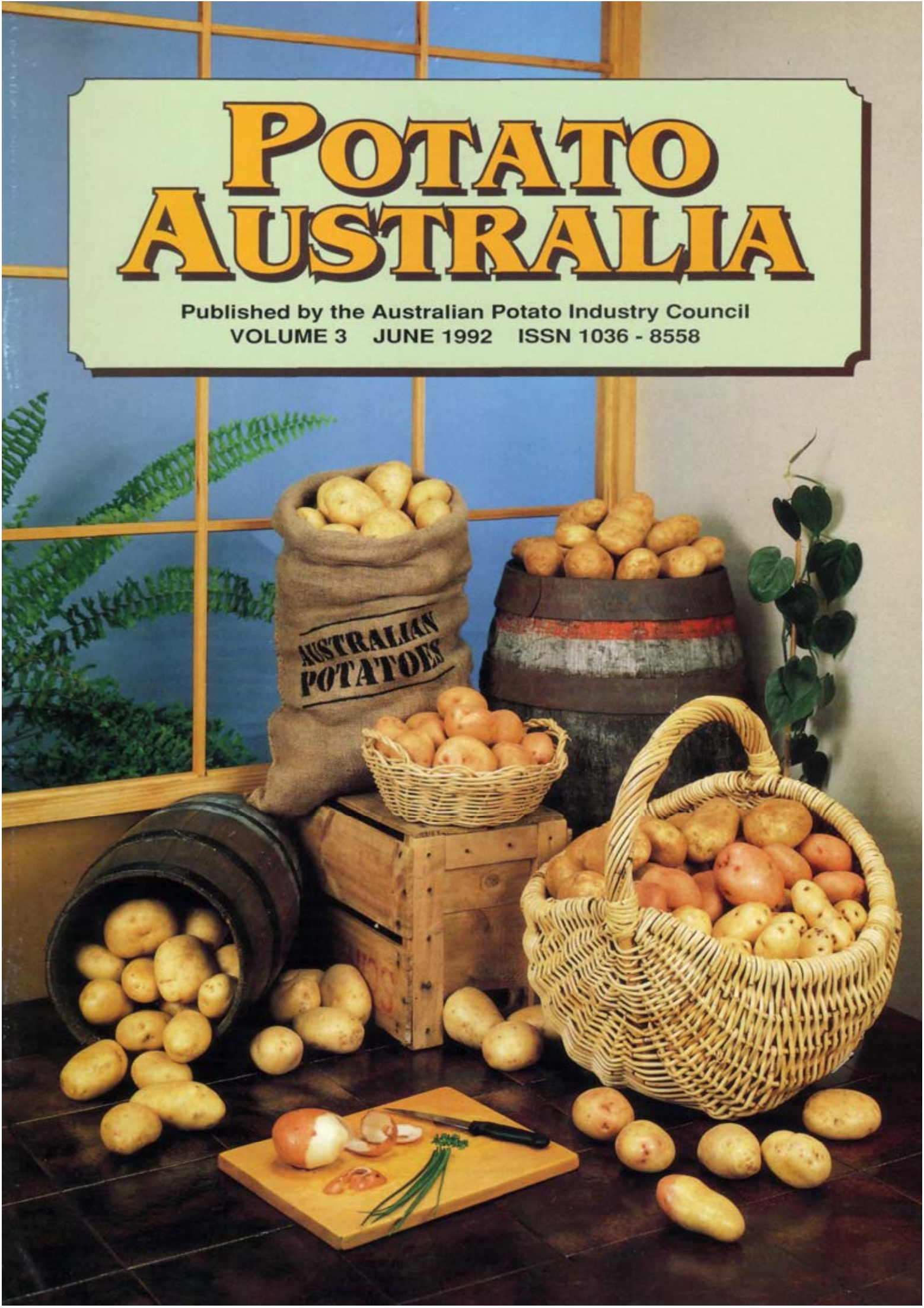

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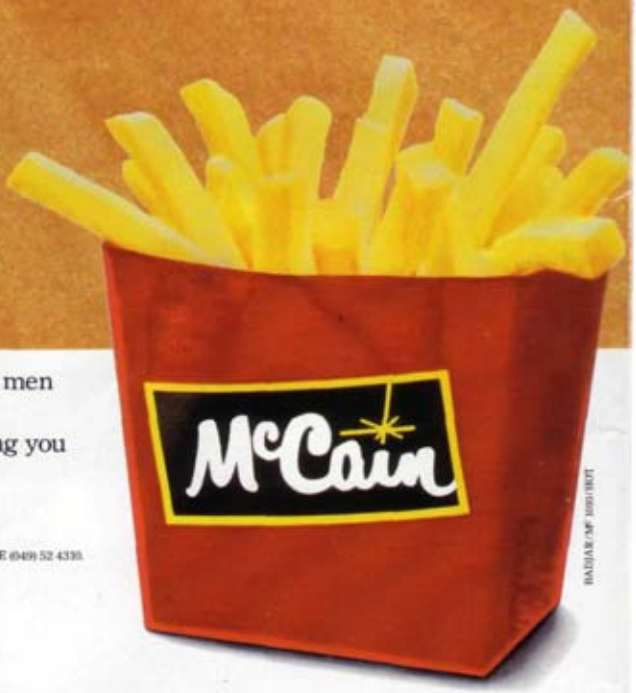

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AUSTRALIAN POTATO INDUSTRY COUNCIL

VOLUME 3, JUNE 1992
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Editorial

JOHN SALVESTRIN is a District Horticulturist specialising in vegetables at Griffith with NSW Agriculture.

Our Chairman's report and other articles in the magazine highlight the traumatic times our Industry is going through.

How vital it is in such a situation to be aware of the changes occuring, where we might be heading and very importantly, how technological progress can empower us to adapt to those changes.

Our thanks go to the authors from all States who have contributed to the magazine, so we can provide that information for you. Without them the magazine could not succeed.

This is your magazine and consequently your letters and comments on the issues, topics and general layout are valued. It is important that your needs are addressed. So keep writing and hopefully the magazine will continue to improve.

This edition is slightly larger in size and greater numbers have been printed. Our aim, as always, is that everyone in the Australian Potato Industry will receive a magazine free.

Good reading.

—JOHN SALVESTRIN, Editor

INVITATION TO CONTRIBUTORS AND ADVERTISERS

This magazine will be published annually in June. Articles are welcomed on any topic related to potatoes. Please submit copy of articles and advertising to: The Editor, 'Potato Australia', P.O. Box 1087, Griffith, NSW 2680. Phone (069) 630555 Fax (069) 630255.

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ACKNOWLEDGEMENT:
Front cover photograph— Romic Pajak and John Farrow of the Department of Primary Industry, Hobart, Tasmania.

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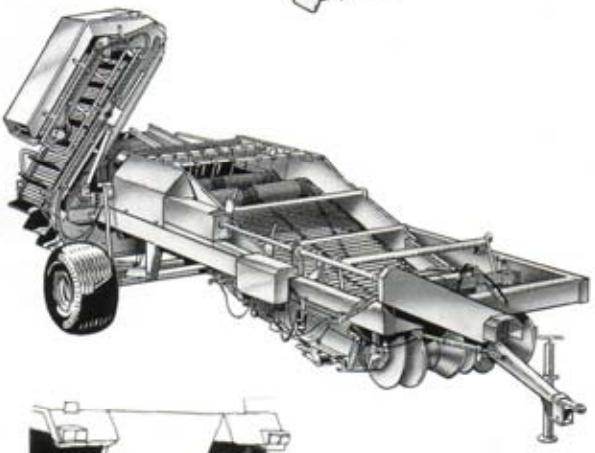

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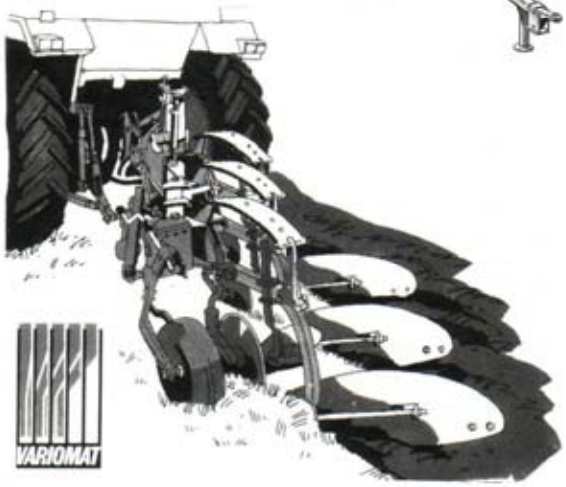

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Chairman's Report

WAYNE CORNISH is the Chairman of the Australian Potato Industry Council.

The last 12 months have seen further changes within our industry. Each year we say it cannot get any worse than this, but it does.

Restructuring of some parts of the processing industry has recently been affected. Processors are saying international best practices and efficiencies are required and appear to be looking to growers to provide cheaper raw products. Growers are clearly saying the stone will "yield no more blood". All this under threat of imports of foreign product coupled to a Government and an Opposition policy which apparently doesn't give a damm if we have an Australian industry at all.

The fresh market remains oversupplied with consequentially very low prices.

We need new approaches, new fresh markets, value added markets and a clear encouraging government policy which will augment total industry success and viability.

Through APIC and our linkages to other organisations, we are representing the industry in all vital issues, including food safety and the pesticide issues. There is now a better understanding by the community of farm chemical usage issues. The new Pesticide courses being introduced in most States, is a further indication of industry awareness.

WAYNE CORNISH

My recent involvement with the New Zealand industry at the Trans Tasman Horticultural Conference indicates that apart from a present stronger domestic fresh market, we share most concerns.

A more positive note is the introduction of the compulsory levy for Research and Development (R & D) which commenced last August. This compulsory levy is undergoing the expected "teething period" but with industry co-operation and the built in DPI & E audit process, I expect we will be through this phase quickly.

The APIC R & D committee had its inaugural meeting in March to consider projects submitted by various research groups. I welcome Dr Jim McWilliams who was selected by industry to head this committee. His vast experience in research will serve industry well. The APIC R&D Committee comprises of the Independent Chair, grower, processor and merchant representatives.

The HRDC Board reserves the right to endorse the APIC R&D committee's R&D priorities. This task was completed in May. The projects approved are presented in the article, 'Funding your Research and Development' found on page 6 in this magazine.

Potato Cyst Nematode presents itself as a very major problem and challenge for the Australian Industry. As a result of a Special APIC PCN forum held in February, the Horticultural Policy Coundil (HPC) was requested to fund an impact study. The HPC subsequently agreed and put a working group in place to facilitate that study with the result due hopefully by September 1992.

I hope clear directions in relation to Government and Industry policy can be achieved utilising the findings of the report. Responsible and reasonable protocols for the ongoing protection and viability of our industry is our aim. PCN has implications for many other Horticultural authorities besides the potato industry and these implications require greater ident-ification.

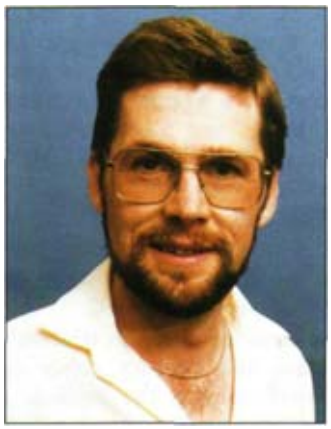
Potato promotion or perhaps the lack of it, is on the agenda of APIC. There remains a range of views on this subject. I guess the debate comes down to how the industry feels it can best provide for itself and who pays. Whatever the outcome never forget we are not 'insulated' in the market place. With food nutrition and safety a high priority in the community our low fat high fibre, nutritious and convenience message must be transferred to the consumer. Awareness through education, pitched at various levels with schools included, is in my view vital, regardless of who facilitates it.

Finally, I believe now we are seeing the rewards for industry having established this multi sector industry organisation, APIC.

I thank John Salvestrin for his continued involvement in the production of this excellent industry magazine. This is now the 3rd edition and it is going from strength to strength.

I wish you all well in your endeavours.

Funding your Research & Development



JONATHAN ECCLES is a Program Support Manager with the Horticultural Research & Development Corporation in Sydney.

The Horticultural Research and Development Corporation is the research arm of the Australian horticultural industries. It is responsible for the co-ordination and funding of horticultural research and development at a national level.

Research and development is necessary for Australia's horticultural industries to reach their full potential in supplying quality produce to local and export markets and to improve returns to the industry.

The Corporation was established in August 1988 to help the industry co-ordinate and fund its R & D requirements.

THE CORPORATION'S OBJECTIVES ARE:

- to improve the efficiency and competitiveness of Australian horticulture by effective and relevant R & D;
- to develop an industry awareness of the benefits of coordinated R & D, and
- to ensure accountability for expenditure on R & D.

TO ACHIEVE THESE OBJECTIVES, THE CORPORATION:

- consults with industry groups to determine priority R & D needs;
- helps individual industries determine the most appropriate mechanism for the raising of funds for various R & D programs;
- liaises with public and private agencies to undertake R & D identified as industry needs;
- financially supports R & D projects with funds contributed by the industry and matching grants from the Commonwealth Government;
- coordinates R & D programs to optimise efficiency and effective ness; and
- monitors the progress of each R & D project and reports on its outcome to the industry.

Funding of research and development by the corporation is on the basis of equal cost-sharing by industry and the Commonwealth Government. That is, for every $1 contributed by the industry, the Commonwealth will also contribute $1 (to a maximum of 0.5% of the gross value of production).

HOW DOES INDUSTRY CONTRIBUTE FUNDING TO R & D ?

An industry can contribute funding three ways:

1. A statutory levy can be established to provide funding for an industry's R & D needs at the request of the majority within an industry.

   The levy is collected under the Commonwealth Horticultural Levy and Export Charges Acts, normally at the first point of sale of the produce. The rate of levy to be collected is based on the industry's recommendation.

2. An industry organisation may wish to collect its own R & D funds by voluntary levy. Members regularly pay amounts to the organisation which establishes its R & D needs in consultation with the HRDC.

   The industry convenes its own R & D committees which reviews grant applications submitted to it directly. The applications which the committee wishes to fund are then passed on to the HRDC with the money required to meet half the project's cost. The HRDC then makes the final decision in accordance with its own R & D plan.

3. Project-related voluntary contributions are used by an industry which may wish to support a specific project or address a specific R & D need.

THE POTATO LEVY

In August 1991, a statutory levy was introduced to support R&D within the potato industry at a national level. The levy is collected from both growers and processors on the following basis:

- **for potatoes destined for the fresh market, and for potatoes sold as seed, the levy is collected at the first point of sale;**
- **for potatoes destined for subsequent processing, the levy is to be collected by the processor.**

THE LEVY RATE IS:

- **50 cents/tonne paid by the grower for potatoes destined for the fresh market;**
- **50 cents/tonne paid by the grower for potatoes sold for use as seed;**
- **50 cents/tonne paid by the grower for potatoes destined for processing; and**
- **50 cents/tonne paid by the processor for potatoes used for processing.**

Levies are collected by the Levies Management Unit of the Australian Department of Primary Industries & Energy. Funds are then transferred to the HRDC. Levies collected in a financial year are used to fund R&D projects in the following year. For example, levies collected in 1991/92 will be used to fund R&D projects in 1992/93.

With the size of the potato industry in Australia, the receipts from the levy were estimated to be $750,000 per annum. Receipts in 1991/92 have been much lower than anticipated and consequently, this has seriously reduced the capability to fund projects in 1992/93 (see Figure 1). Many projects will still be funded by voluntary contributions from industry.

In this case, the project investigator submits a grant application to HRDC indicating that half the project funding will come from some industry donor.

The funding of research and development by way of statutory levy has advantages in discouraging 'free-loaders' and in allowing better planning of short, medium and long-term R&D programs to address industry needs. R&D based on project related voluntary contributions allows little room for planning and often revolves around adhoc, 'quick fix' R&D.

R & D COMMITTEE

With the introduction of the potato levy, the Australian Potato Industry Council were asked by the HRDC to form a technical R & D committee. This committee comprises representatives from the farming, merchant and processing sectors of the industry.

The committee met shortly after the Corporation's closing date for applications (28 February) to review submissions which were seeking funds from the potato levy. Recommendations on projects are made to the Board of the HRDC which is responsible for the R & D program. However, it is only the Board which is empowered to approve project applications.

Table 1 lists those projects which have been approved by the HRDC for unding in 1992/93. Funding is conditional on final approval of the program by the Minister of Primary Industries & Energy.

FIGURE 1
Horticultural Research & Development Corporation POTATO LEVY 1991/92

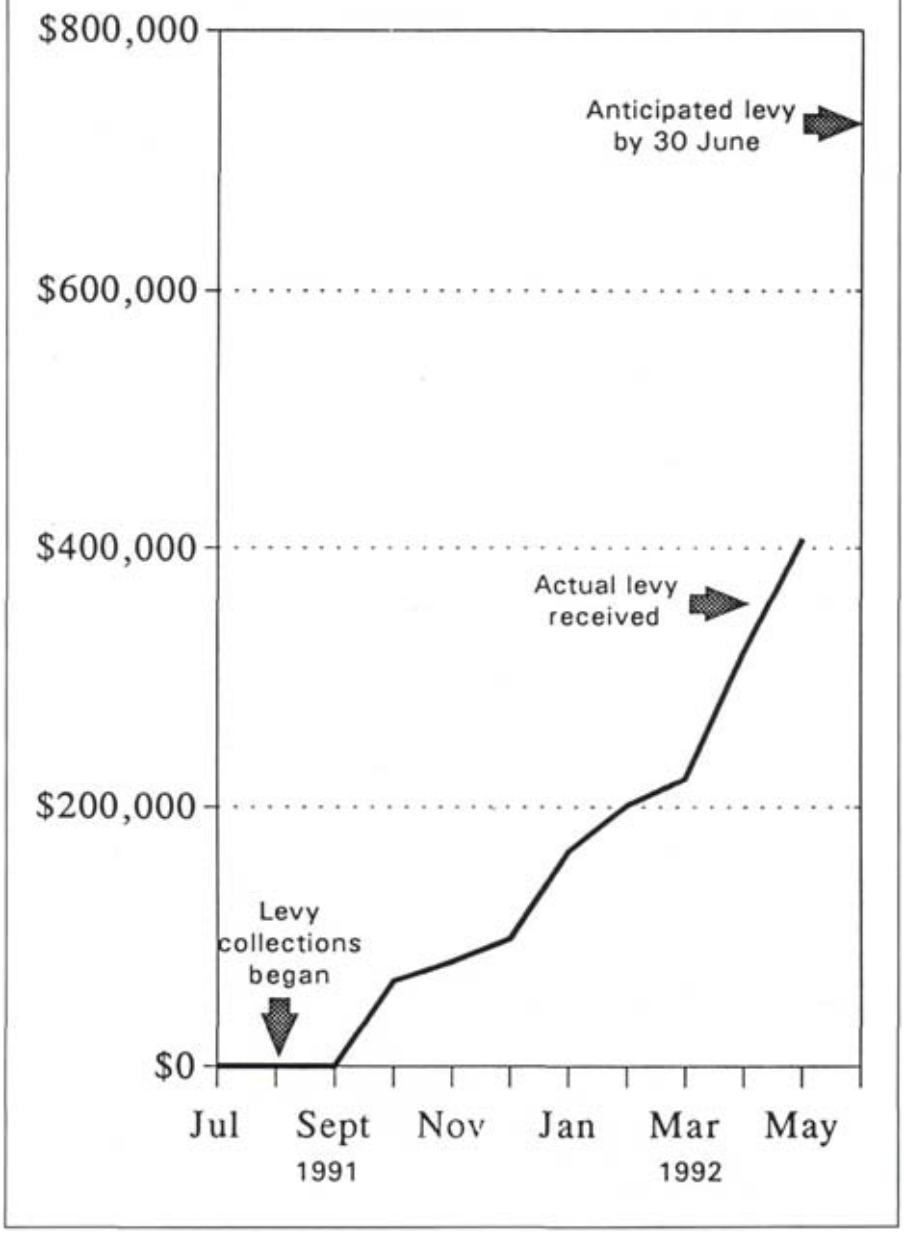


TABLE 1: Projects approved by the HRDC for funding in 1992/93

- The control of volunteer potato plants in subsequent vegetable, pyrethrum and poppy crops
- Soil fertility management for potatoes, Atherton Tablelands
- Improved productivity and quality of crisping potatoes in Australia
- Improved productivity of the potato French fry industry in Victoria
- Development of the potato processing industry in South Australia
- Soil insect pests of potatoes
- Improving market quality of ware potatoes
- To improve postharvest handling, storage and processing quality of Atlantic and Cadima potatoes
- Rapid detection, epidemiology & control of Tomato Spotted Wilt virus in seed & processing potatoes
- The management of cadmium levels in potatoes and other vegetables
- Control of Black leg, Black scurf and other postharvest storage rots of seed potatoes
- Decision support software for the nutrient management of irrigated potato crops
- Evaluation & development of new potato genotypes for SA for French fry, crisp & fresh markets
- Improving seed handling technology
- Utilising potato microtubers for field production of seed potatoes
- Development of phosphonate and phosphonate based fungicides for the control of late blight in potato
- 7th National Potato Research Workshop
- Potato breeding & cultivar trials in Australia—Tasmania
- Control of stem end browning of Russet Burbank potatoes
- A national survey of cadmium in potato tubers and soils
- Phosphate, nitrogen and irrigation management in potatoes
- Potato breeding & cultivar trials in Australia—Western Australia component
- Development of a commercial assessment method to detect parasitoids of the potato moth
- Non frozen fresh potato products
- Potato breeding & cultivar trials in Australia—Victoria component
- Development & application of training programs for IPM techniques in Southern Australia
- Potato breeding in Australia—Variety evaluation for NSW
- Potato breeding & cultivar trials in Australia—Queensland component
- Potato Conference—Canada

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Potato Industry:

CRISIS or RESTRUCTURING ?

RENE DE JONG
is a Horticultural Development Officer with the Department of Food and Agriculture at Ballarat.

There is a deafening silence in the potato industry that needs to be aired:

Potato growers are going broke but don't want to talk about it.

This is occurring throughout the country and mostly affecting fresh market suppliers.

With the cost of production in most districts set at around $150/tonne, (planting, managing and harvesting about $100/tonne and capital depreciation about $50/tonne), it is no wonder that many farmers have and will be leaving the industry this year when prices for fresh potatoes have rarely topped $100/tonne, if they could be sold!

Debt loads on more than 50 percent of all potato properties are higher than considered "healthy" by most financial institutions (of around 20 percent of capital for a sound enterprise) puts a lot of pressure on farmers from lenders when incomes have been negative for two years.

There is no doubt that there is a big shake out of the industry which I estimate will be in the order of 10 to 15 percent. About one third of potato farmers will survive the current situation but find it difficult to get ahead because of the interest bills that will need to be serviced.

Any amount of efficiency with the use of centre pivots, bulk handling or other mechanical innovation cannot overcome the poor returns of the past two years.

Why is it happening?

I think there are some recent events that have contributed to the current hardship being experienced by the industry including:

- Our small land-locked national population combined with the lack of bridges to other countries makes potatoes very price-sensitive to changes in supply.
- The recession has reduced demand for all potato products, fresh or processed.
- The previous three or four years has seen the influx of more potato growers and existing growers expanding production, due to the then higher returns.
- Recent good seasons throughout Australia has contributed to oversupply.

Essentially, there are more (fresh) potatoes than the domestic population is prepared to buy.

I see 3 solutions to the problem:

- REDUCE SUPPLY BY REGUL–ATION (quotas are never popular)
- ALLOW MARKET FORCES TO PREVAIL (current situation)
- INCREASE THE PRODUCT RANGE AND DEMAND BOTH HERE AND OVERSEAS.

Increasing demand on a local level means alternative potato products or promotion of existing products. Two years ago I heard a speaker at a potato conference at Gatton say that the fresh potato industry spent $60,000 on promotion compared to a $2 million promotion by the tomato paste industry. So in reality the promotion in the potato industry has been negligable.

Potato marketing boards have come and gone.

The alternative to export is likely to be achieved by developing and promoting processed products. The high weight and low value of fresh potatoes limit fresh potato exports compared to processed products.

The ball game is constantly changing and the industry needs to anticipate its next move not only to survive but to thrive.

Taiwan currently has a growth rate in the order of 8 percent per annum. Singapore continues to grow at a similar fast rate. These events alone mean that we are edging closer to a cost structure (where our wages for example are more aligned with these countries) resembling our neighbouring trading nations. Both these nations are westernising which means potato consumption is likely to increase. This presents the potato industry with opportunities that would be silly not to investigate.

The potato industry is facing the challenge of tackling the issues—increase demand for potato products (promotion or offering alternative products) or exporting (value added

products). Recessions are times of change, mostly out of necessity. If nothing is done now we will probably see another 10 percent of growers leaving the industry and 30 percent struggle through in about eight years time (the average time between recessions) — the boom bust cycle will continue.

We need unity between individual farmers, processors and others in the marketing chain and set out to produce for the growing markets in our region of the world

Strength is in unity.

THE FOLLOWING TABLE HIGHLIGHTS SOME MARKETS TO WHICH THE UNITED STATES EXPORTS (from "Potato Facts", US Deptartment of Agriculture, Fall/Winter 1991/92.

Destination	Fresh 1/	Frozen 2/	Chips	Dried 3/	Canned	Starch	Total 4/
			1,000 Cwt farm weight equivalent				
Bahamas	795	22,196	4,122	2,815	275	—	30,204
Canada	327,003	157,486	47,293	23,667	11,051	4,926	571,427
Hong Kong	957	43,307	3,582	4,020	45	—	51,912
Japan	—	535,717	1,146	249,871	1,067	16,326	804,128
Malaysia	—	17,986	2,615	235	—	398	21,235
Mexico	16,296	11,578	33,160	3,692	752	1,446	66,923
Philippines	—	15,374	8,067	3,468	1,337	—	28,247
Singapore	346	24,713	3,526	15,138	523	—	44,247
South Korea	52	22,571	1,507	292	—	14,160	38,582
Sweden	—	9,634	866	18,597	187	—	29,285
Taiwan	58	23,037	9,919	11,551	4	—	44,569
All others	4,623	31,168	26,416	36,474	2,961	7,582	109,224
TOTAL	350,129	914,767	142,219	369,821	18,205	44,838	1,839,981

1/ Includes seed and tablestock. 2/ Includes frozen french fries and other frozen. 3/ Includes flakes, granules, flour and dried. 4/ Converted to farm weight equivalents using 1 pound for fresh, 2 pounds for frozen, 3 pounds for chips, 7 pounds for dried, 1.6 pounds for canned and 9 pounds for starch. **Source: Bureau of the Census, US Department of Commerce**.

POTATO CYST NEMATODE

Impact & implications for growers

DR JILLIAN HINCH is the Nematologist at the Victorian Department of Food and Agriculture, Institute of Plant Sciences, Burnley and is responsible for the scientific aspects of the Potato Cyst Nematode Program.

The outbreaks of Potato Cyst Nematode (PCN) in Victoria detected early last year have had a large impact on the Australian potato industry and especially on growers in Victoria.

INTRODUCTION

The nematode or eelworm is a soil-borne organism which invades the roots of potato plants causing poor growth and is spread through infested soil. The main reason PCN impacts on the industry is through restrictions imposed on trade and marketing because it is a quarantinable pest in most countries of the world. Australia is the last major potato producing country to detect the presence of PCN and as a result can benefit from many decades of research and control strategies conducted overseas.

CURRENT SITUATION AND RESTRICTIONS

The current restrictions in Victoria on properties where PCN has been detected are outlined below. It must be remembered by growers that the situation is dynamic and is changing constantly, so what is true at present may well be revised by the end of the season. The aim of officers in the Department of Food and Agriculture is to allow growers to continue to trade as profitably as possible under the circumstances whilst maintaining strict regulatory control over movement of potentially infested material and enable growers to satisfy the import requirements of other states.

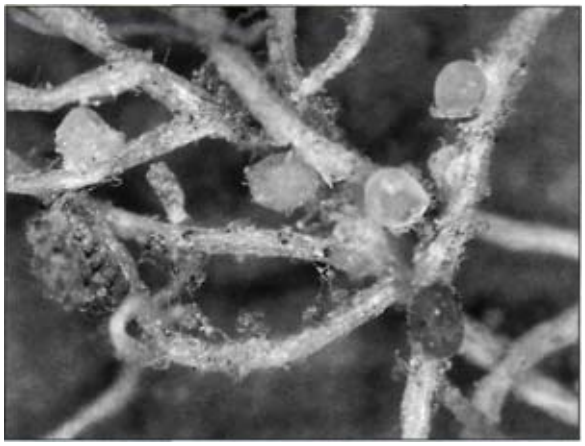
- **Wandin-Silvan Area**
  All properties in this area are prohibited from marketing potatoes under regulations amended to the Victorian Vegetation and Vine Disease Act. This should discourage people from growing potatoes except for home consumption and with time allow any undetected infestations to die out. There are five known infestations in this market-garden area of the Dandenongs.
- **Interstate Restrictions**
  Quarantine officers in Queensland, South Australia and New South Wales have restrictions on importation of potatoes grown on properties within 20km of a known PCN infestation (with the exception of Gembrook see below). Western Australia and Tasmania will not accept Victorian potatoes.
- **Gembrook**
  Gembrook falls within the 20km radius of Wandin-Silvan and two infested paddocks were detected in Gembrook this year when the entire region was soil sampled. The infested paddocks will be fumigated and put down to pasture as soon as the crops are harvested. A new protocol has been established to enable growers in Gembrook (whose properties are not infested) access to the Sydney market. Gembrook potatoes can be sold brushed in supermarket packs up to 20kg or in 50kg packs if especially labelled or in bulk to approved packers in NSW.
- **Rosebud**
  One infested property was found near Rosebud. The infested paddock

Symptoms of PCN in the field. Stunted crop at Wandin, Victoria, flowering.

has been fumigated and growing of potatoes on this area is prohibited. Carrots will be sown (with the usual pre-plant nematicide) and sold pre-washed.

- **Emerald**

A recent discovery of PCN occurred during a quarantine bulb inspection. The six week old imported bulbs were growing on leased potato land which had not had a crop for 4-6 years however self-set potatoes were evident. These self-sets had allowed PCN to survive. As the property had a 27 year history of growing potatoes every second year it is difficult to determine the length of the infestation. This case serves to illustrate how important it is to rogue out self-set potatoes during crop rotations.



Potato Cyst Nematode

MAJOR ISSUES

Some states have imposed import restrictions based on a 20km radius from a known PCN infestation. This legislation has caught up many growers whose properties have not tested positive for PCN to the extent that processing potatoes are not permitted to move interstate even though the processing plants have the latest facilities for safe disposal of waste. An example of this is the Koo-Wee-Rup Swamp region which is within 20km of Gembrook. Here farms to the north of the main drain are restricted from interstate movement but farms to the south of the drain are free to move interstate.

In past years a small number of growers in South Australia and NSW received "one-off seed" from the infested Gembrook properties. Officers in these states have been informed, as have the growers concerned, and the properties checked for presence of PCN infestations.

A major problem confronted by Department of Food and Agriculture staff is finding an outlet for potatoes from infested paddocks and even non-infested paddocks from these farms. It has proved difficult to find washers and packers to handle the potatoes as well as processors. This problem will continue and it is a matter for people in other states to consider as PCN may well be found in your state and the same problem will emerge.

VICTORIAN SURVEYS FOR PCN

By the end of the present season in excess of 3,000ha of potato crops will have been surveyed by soil sampling (or growing plant inspection where appropriate). This is approximately 25% of the total Victorian crop and includes all certified seed crops. Most regions have been completed at this stage with a few late crops to come in. It is hoped that eventually results will be available on individual paddocks before crops are planted. The percentage of land found to be infested with PCN is less than 1% of the potato crops tested.

RESISTANCE

Recent research conducted at the Institute of Plant Sciences, Burnley has determined that some outbreaks of PCN in Victoria have been of a mixed species composition, ie a mixture of the two forms of PCN *Globodera rostochiensis* (golden form) and *G. pallida* (pale form). This mixed population makes the deter-mination of control strategies difficult as good resistance is available in potato cultivars to *G. rostochiensis* but not at the present time to *G. pallida.* In situations where only *G. rostochiensis* exists and it is present in low numbers (ie less than 4 eggs/gm) the best way of controlling PCN and reducing the nematode population is to continually plant resistant cultivars. By using this method numbers can be drastically reduced far more effectively than with chemical fumigants or nematicides to the point where growers can return to planting susceptible but preferred (by market or grower) cultivars.

This method has successfully been used in the eastern United States and is being tried in Western Australia. However in Victoria we not only appear to have the mixed infestations but also at medium to high numbers, eg our lowest infestation detected so far is 7 eggs/gm and many other infestations are around 100 eggs/gm. Planting cultivars with resistance to *G. rostochiensis* in this situation would lead to an increase in *G. pallida* which is more difficult to control.

We are still waiting on results of pathotype screening from England as our isolates are being tested against both the H_1 and H_2 potato genes.

On the bright side much research work is being undertaken in Britain and Europe on resistance breeding aimed at incorporating resistance to both species in cultivars with good agronomic character-istics.

Progress in this area will be speeded up by mole-cular biology as two recent groups one in U.K. and one in Germany have cloned plant genes and mapped genes which are expressed at the infect-ion site.

Once these genes have been identified it may be possible to manipulate these genes so that nematodes are unable to establish the feeding sites necessary for successful plant colonization.

Agriculture Science Graduates, Linda and Andrew, process thousands of soil samples per year for the presence of potato cyst nematode cysts in the Department of Food and Agriculture's specially dedicated PCN soil testing laboratory at the IPS.

Certified seed production in Victoria

K.W. BLACKMORE is a Senior Certification Officer at the Institute of Plant Sciences, Toolangi, Victoria.

The Victorian Certified Seed Potato Scheme has continued to develop and change to meet the changing requirements of the potato industry.

Some of the recent changes made include:

- **SOIL TESTING**

  Compulsory soil testing for Potato Cyst Nematode (PCN) for all seed potato crops. Soil is collected on a 10 metre x 10 metre grid across the paddock and tested for the presence of PCN at the Department of Food and Agriculture's laboratory at Knoxfield. Seed is not "Certified" until the results of the tests are available. The PCN tests have cost the seed industry an extra $51,000 this season. While the tests cannot provide an absolute guarantee the cysts are not present a negative test result combined with good hygiene and rotation practices is the best practical prevention possible.

- **BIN CLEANLINESS CERTIFICATES**

  Minimising the risk of spread of pest and disease to seed growers properties is of paramount importance. Bin cleanliness certificates were introduced to encourage all seed buyers to only provide clean sound bins for seed growers to fill with Certified seed. Seed packed in "used" bins will not be certified unless accompanied by a certificate. By signing the certificate the owner agrees to pay the cost of returning the bins to his property should an independent arbitrator decide they are a disease risk.

- **FAST TRACKING OF MINI TUBERS**

  A program has been implemented to ensure a high standard of facilities and product quality at all laboratories producing mini tubers and plantlets from tissue culture. There are now five laboratories involved in producing mini tubers for the Certified Seed Scheme. The large increase in the number of mini tubers produced for the seed industry will enable a quicker response to changes in variety needs for the potato industry.

- **QUALITY ASSURANCE**

  Quality Assurance (QA) is an internationally proven method of achieving product quality goals. The first group of growers have received their first audits and are operating under the QA program. The QA is based on international standards and will be supervised by the Department of Food and Agriculture.

- **ROUND SEED**

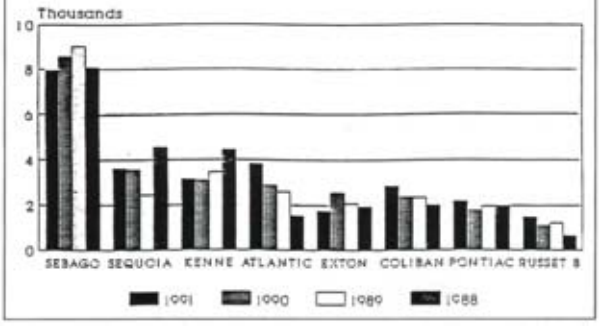
  The demand for round seed, particularly from the crisping industry, is increasing with seed growers becoming more skilled in producing economic yields of round seed to the buyers specified size range.

- **PLANTINGS**

  The area of Certified seed submitted for inspection this year was 1930ha, an increase of 81 ha on 1990/91 season. Most of this increase was in crisping varieties and new varieties. The area of Sebago planted decreased by 81 hectares while Exton and Kennebec also decreased. With mostly ideal planting and growing conditions crop health was very good with below average rejections at field inspection.

Last season a record 30,577 tonnes was Certified.

FIGURE 1: Comparison of tonnes certified for top 8 varieties in the seed scheme (1988-1991) *Institute Plant Sciences Toolangi Nov 91*



Wilcrisp, Wilstore & Wontscab

NEW POTATO VARIETIES FOR CRISPING

ROGER KIRKHAM
and
GRAEME WILSON
are Potato breeders at the Institute of Plant Sciences, Toolangi in Victoria

Bill Giles with a crop of the variety Wilcrisp at Dalmore, Victoria.

Three new potato varieties were released in 1992 suitable for crisp processing. The varieties Wilcrisp, Wilstore and Wontscab were developed by Australia's only potato breeding program which is centred at Toolangi, Victoria.

The **Australian crisp industry** has seen major changes in the potato varieties grown over the past 10 years. Tarago, an Australian variety, and Norchip and Denali, American varieties, have become established for processing after storage and Atlantic Snowchip, also American varieties, are grown for direct processing after harvest.

The potato breeding program at Toolangi imports overseas varieties and selects breeding lines from a large seedling population. This is Australia's only potato breeding program and it supplies germplasm to all states in Australia for testing in local potato growing districts.

WILCRISP, WILSTORE AND WONTSCAB

Wilcrisp, Wilstore and Wontscab are three new varieties that have been produced by the breeding program at Toolangi which have been selected for crisp processing after storage. These varieties have been tested extensively in trials on growers properties in the crisp potato production districts of Victoria and in some trials in other states.

Certified seed of Wilcrisp, Wilstore and Wontscab was sold for the first time in Autumn 1992.

YIELD

Tables 1 and 2 show there is little difference in No. 1 grade, 80-450g, yield between Kennebec, the main variety grown for storage crisp processing and the three new varieties. However each of the new varieties Wilcrisp, Wilstore and Wontscab has higher yields of smaller sized potatoes, in the range 80-250g, which are preferred for crisp processing.

Each of the new varieties produces more tubers per plant than Kennebec which allows them to produce higher yields without over sized or large tubers.

CRISP QUALITY

Each of the new varieties Wilcrisp, Wilstore and Wontscab had lighter crisp colour than Kennebec when processed immediately after harvest.

A high dry matter content is important as it produces higher yields of crisps after factory processing from raw potato.

The varieties Wilstore and Wontscab both had higher dry matter than Kennebec and Wilcrisp has lower dry matter.

TABLE 1: Average Yield and Quality of Crisp Varieties, Victoria, 1988 & 1989

Variety	Yield t/ha 80-450g	Yield t/ha 80-250g	Tubers per plant	% Dry Matter	Crisp Colour*
Kennebec	42.4	29.3	5.1	19.6	5.6
Wilcrisp	42.7	35.2	8.6	18.5	5.2
Wilstore	40.2	34.9	8.0	21.0	5.0
Wontscab	38.6	30.6	6.4	20.1	3.9

* Crisp colour measured at harvest, 1-10, 6 = borderline, >6 = too dark.

TABLE 2: Average Yield and Quality of Crisp Varieties, Victoria, 1990.

Variety	Yield t/ha 80-450g	Yield t/ha 80-250g	Tubers per plant	% Dry Matter	Crisp Colour*
Atlantic	44.0	32.7	6.7	22.0	3.7
Kennebec	46.7	27.9	5.1	19.7	4.5
Wilcrisp	48.5	37.5	9.3	18.9	4.4
Wilstore	47.8	38.6	8.1	21.3	4.2
Wontscab	42.3	32.4	6.3	20.2	4.1

* Crisp colour measured at harvest, 1-10, 6 = borderline, >6 = too dark.

TABLE 3: Crisp Colour after Storage at 10°C, Victoria, 1989.

Variety	Harvest	1	2	3	4	5	6	7	8	9
		Months Stored								
Kennebec	xxxxx	——	——	——	——	??????????????????xxxxxx	——	——	——	——
Wilcrisp	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	——	——	——	——	——	——	——	——	——
Wilstore	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx									
Wontscab	xxxxxxxxxxx????????xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx									

xxxxxx = acceptable crisp colour
??????? = borderline crisp colour
—— = unacceptable crisp colour

CRISP STORAGE

The three new varieties Wilcrisp, Wilstore and Wontscab have been selected for storage before crisp processing. When these varieties were grown in storage crisp potato production areas in Victoria they all performed better than Kennebec which is the variety most commonly grown for storage, Table 3.

POWDERY SCAB DISEASE

Powdery Scab disease is one of the most important potato diseases in Australia. Wontscab has a high level of resistance to Powdery Scab disease as shown in Table 4. This gives results from an inoculated field site where new varieties are screened for resistance to Powdery Scab disease. Only tubers which have 1/10th or less of their surface affected by Powdery Scab are considered to be marketable. In this trial Kennebec had only 4% of its tubers in the marketable range and 96% of tubers had more than 1/10th of the surface affected by scab. In the same trial 68% of tubers of Wontscab were in the marketable category.

TABLE 4: Reaction to Powdery Scab Disease at an Inoculated Field Site, 1988.

Variety	Marketable Yield
Kennebec	4.0%
Wontscab	68.5%

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GOING THE EXTRA MILE

SUMMARY

Australia's potato breeding program based at Toolangi has released three new potatoes for crisp processing. Wilcrisp, Wilstore and Wontscab have been tested in trials in crisp potato production areas in Victoria and are recommended as varieties suitable for both direct processing and storage prior to processing.

ACKNOWLEDGEMENT

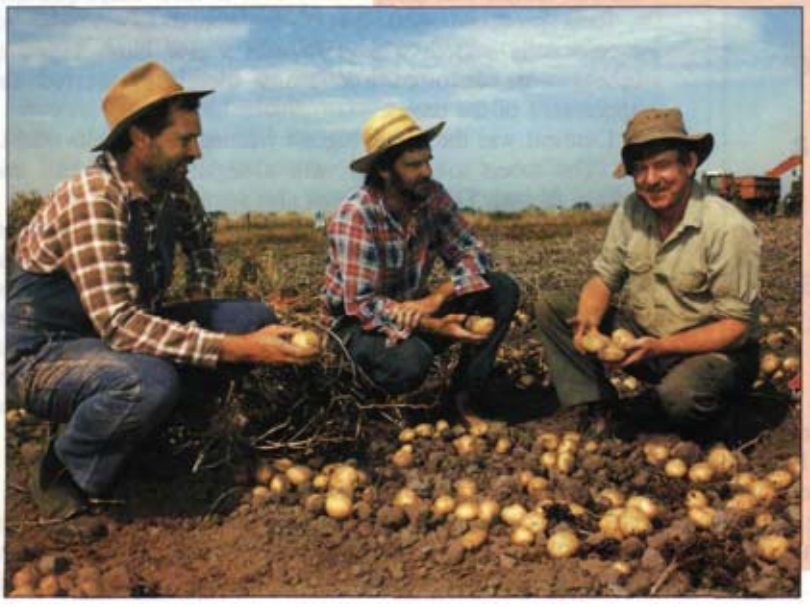
- *Some crisp processing tests of these varieties were made by the crisp processing companies, CCA Snack Foods and Frito-Lay Australia.*
- *Most of the trials testing these varieties were on private growers properties.*
- *We would like to thank these growers and companies for their help in developing these varieties.*

TOP: Harvesting a potato variety trial at Ray Maloney's property at Koroit, Victoria.

CENTRE: Weighing samples at a potato variety trial at the property of Gary Willis, Thorpdale, Victoria.

LOWER LEFT: Roger Kirkham. Graeme Wilson and Tony Evans look at the variety Wontscab at Bayles, Victoria.

LOWER RIGHT: Test cooking new potato varieties at the Department of Agriculture, Toolangi, Victoria.



More varieties resistant to PCN for WA

PETER DAWSON, TONY NELLA and JEFF MORTIMORE work on the Western Australian potato variety evaluation programme. Peter Dawson and Jeff Mortimore are at Bunbury and Tony Nella is based at the Medina Vegetable Research Station.

Although WA has successfully contained the outbreak of PCN which occurred in 1986 resistant varieties are required for two reasons.

First, growers in the quarantine area where this pest was found must grow resistant varieties. This is done to rapidly reduce the level of nematode cysts in the soil. The only resistant variety available to them is Atlantic which, although ideal for processing as crisps is not suited to the fresh market because it disintegrates when boiled and has a rough netted skin.

Second, resistant varieties suitable for our conditions must be found as insurance against further outbreaks.

In volume two of Potato Australia the testing of 13 varieties resistant to PCN *(Globodera rostochiensis* Ro1) was reported. Since then a further 11 varieties have been tested alongside five varieties previously examined. Three varieties; Hudson, Nadine and Nicola were chosen for further testing to complement last year's selection, Marijke.

METHODS

The trial

16 varieties were planted in May at Len and Fran Mihaljevich's property at Munster.

The selection was on the basis that the fresh market requires a potato that boils well as that is how 87% of consumers cook their potatoes in Western Australia. The potato should also wash well and have an attractive, smooth skin. To be successful the variety must also be high yielding and resist skinning and bruising.

RESULTS

Growth of trial

The trial was planted on May 22, 1991. All varieties emerged from three to five weeks after planting and grew well. The crop closed about nine weeks after planting. The earliest varieties matured 18 weeks after planting and the later varieties at 22 weeks. Nicola, Hudson, Darwinia, Cardinal and Atlantic still had some green haulms at harvest on October 23.

Yield

Yield results are presented in Table 1. Five varieties produced higher yields than Atlantic while a further two produced higher yields than Marijke.

The highest yielding variety was Cardinal with a grade 1 yield of 47.2 t.ha. This variety has a smooth pink skin and a yellow flesh. At harvest tubers were already beginning to shoot. Many tubers also were distorted and dumb-bell shaped.

The second highest yield was produced by Aminca, 46.7 t.ha. Its shape was a little distorted, many tubers having tapered stem ends.

Nicola was the third highest yielding variety with 46.0 t/ha of grade 1 tubers. This is a smooth, yellow fleshed and yellow skinned variety. It was one of the latest to mature and tubers skinned badly. The shape of the tubers are oblong, medium size and the sample was very even.

Nadine was fourth highest yielding variety with 45.6 t/ha. Nadine has tubers which are slightly netted skin and oblong shape. The skin and the flesh are both cream coloured and the tubers have an attractive even oblong shape. Some skinning occurred and growth cracks were seen.

Hudson was next with 45.1 t/ha. The tubers are large and round to flat oblong. Some common scab-like lesions were seen.

Atlantic was the sixth highest yielding variety with 44.0 t/ha. The sample was exceptionally even in tuber shape and size.

Rosa produced 42.0 t/ha of flat round tubers with an exceptionally smooth white skin with a pink blush. However tubers were distorted and many blemishes marred the appearance of the tubers.

Diament was the eighth highest yielding variety with 38.1 t/ha. The tubers are oblong with a slightly netted skin, and yellow fleshed. This variety was also starting to shoot.

Marijke produced the ninth highest yield of grade 1 tubers with 36.6 t/ha. The tubers are oblong with many banana shaped ones. The larger tubers were distorted around the eyes.

The remaining two varieties with a reasonable yield were Fresco and Hampton. These varieties had slightly netted skin and were reasonably attractive tubers. Low yields were produced by Darwinia, Pentland Javelin, Premiere, Junior and Islander.

Boiling tests

Cooking results are shown in Table 1. The most important test is for sloughing during boiling. A low score shows the variety boils well. Nicola boiled best, then Nadine. Other

TABLE 1: Yield of PCN resistant potato varieties at Munster, 1991 & 1990 and cooking test results for 1992.

Variety	Yield (t/ha)				Boiling tests		Crisp colour+
	1992			1991	Slough*	ACD**	
	30-80g	80-450g	v450g				
Aminca	4.3	46.7	0.4	35.0	2.5	2.0	5.0
Atlantic	2.5	44.0	0.0	23.9	4.3	2.0	3.3
Cardinal	6.6	47.2	0.0		2.7	2.0	6.0
Darwinia	5.4	34.1	0.0		3.0	2.0	4.7
Diament	8.0	38.1	0.3		2.3	1.3	6.3
Frescoe	2.3	35.2	0.0		2.0	1.7	8.0
Hampton	2.1	34.2	0.0		2.7	2.0	5.3
Hudson	2.5	45.1	1.4		2.7	1.7	6.0
Islander	6.5	21.7	0.0		2.0	1.7	4.7
Junior	4.9	23.6	0.0		2.7	2.7	6.7
Marijke	2.6	36.6	0.0	32.8	2.7	1.3	6.0
Nadine	5.2	45.6	0.3	30.7	1.7	1.3	9.0
Nicola	5.8	46.0	0.0		1.3	1.0	8.0
Pentland Javelin	6.3	26.2	0.0		3.0	2.7	5.0
Premiere	5.2	25.9	0.0		3.7	2.0	4.7
Rosa	6.4	42.0	0.3	25.3	2.7	2.0	4.7
LSD (5%)	2.4	9.9	0.9		1.0	0.9	1.2

* the lower score, the better the variety boils ** ACD = after cooking darkening, a low score is best
+ scale of 1 -10, 1 = light colour, 10 = black

varieties with acceptable boiling quality were; Frescoe, Islander, Diament, Aminca, Cardinal, Hampton, Hudson, Junior, Marijke and Rosa.

After cooking darkening (ACD) of the flesh 24 hours after cooking was least in Nicola, Nadine, Marijke and Diament. Discolouration was worst for Junior and Pentland Javelin.

Fry colour

Fry colour was highest for Nadine which cooked to a very dark brown colour. Nicola fried dark too though not as bad as Nadine. All other varieties would be acceptable as home cooked French fries.

Dormancy

The short dormancy of some of the selected varieties is of concern. Nicola had a dormancy of only three weeks after dying off. When this is combined with poorly set skins at harvest its suitability must be questioned. Nadine also had a fairly short dormancy at four weeks after dying off. The varieties; Hudson Marijke and Atlantic had dormancy of five weeks.

Industry's choice

Opinion of the industry at the field day was in favour of the selection of Nadine. Hudson, Nicola and Marijke were also given approval.

FIGURE 1: Tubers of Nadine showing even oblong shape and fairly smooth skin.

FIGURE 2: Tubers of Hudson showing large size and round blocky shape. The skin is inferior to the other two varieties for the fresh market.

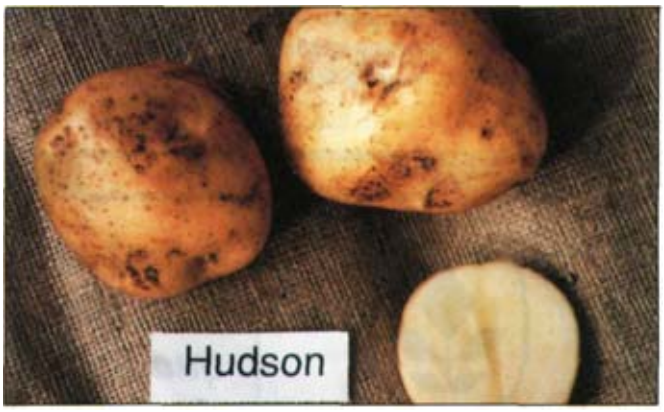


FIGURE 3: Tubers of Marijke showing oblong, tapered shape and smooth skin.

DISCUSSION

Four varieties should be considered as possible replacements for Atlantic for the fresh market. These are Nadine, Nicola, Marijke and Hudson.

Nadine performed very well in this trial as it did the previous season (see Table 1). Table 2 also shows that Nadine has out-yielded Marijke in June and February plantings. This variety was bred for the wash-pack trade and

has attractive, oblong, even shaped tubers (see Figure 1). The faults of this variety appear to be its slightly netted skin, skinning, short dormancy and its dark fry colour. The points in its favour are the consistent, high yield achieved in trials, the appearance of the tubers and its excellent boiling quality.

The dark fry colour should not prevent the selection of this variety. Its acceptance is the compromise that must occur when selecting new varieties because the perfect variety will never be found. We believe this compromise is more than acceptable because only a small proportion of potatoes are fried by consumers. This variety should be further tested and bulked for commercial scale trial. Nadine was favoured over the other varieties by industry members who attended a field day where results and samples were presented.

Nicola is another variety which should be tested further, it has excellent shape and boiling quality. Its longer growth period may however make it unsuited to the metropolitan area where many crops have to be sprayed off the meet delivery agreements. Also the short dormancy from a winter grown crop is of concern.

Hudson is another variety which performed well, it sets a firm skin early which is an advantage over the previous two selections. It also has a longer dormant period. The tubers are large and blocky (see Figure 2) and this variety should also be bulked for further testing.

Marijke tuber quality was consistent with last years trial results. It was once again found to boil acceptable (though not well), fry to a medium colour and produce smooth skinned tubers (Figure 3). Yield of Marijke was low in this trial, it came ninth compared with fourth last year. Perhaps this seasons better growing conditions allowed other varieties to yield closer to their potential. Marijke had the equal fourth highest specific gravity. Overseas this variety is used for processing into French fries. Table 2 shows that from a November planting at Manjimup Marijke yielded very well and produced a high specific gravity.

TABLE 2: Marketable yield (t/ha) of PCN resistant varieties plus Delaware (standard fresh market non resistant variety in other Western Australian trials).

Variety	Medina June 1990	Margaret Riv. October 1989	Manjimup November 1990	Medina February 1990
Aminca	54.2	48.0	53.1	18.4
Atlantic	59.8	—	—	27.7
Marijke	47.5	—	66.2*	17.1
Nadine	57.9	54.1	54.1	21.3
Rosa	53.2	—	—	19.6
Delaware	67.6	56.1	68.1	25.5

* highest dry matter in this trial

ACKNOWLEDGEMENTS

Len and Fran Mahaljevich for growing the high yielding variety. This work is part of the Potato Variety Evaluation Programme which is funded by the WA Potato Growing Industry Trust Fund and the Horticultural Research and Development Corporation. The help of staff of the Medina Intensive Industry Trust Fund and the Horticultural Research and Development Corporation. The help of staff of the Medina Intensive Industries Research Station is gratefully acknowledged. Some seed was provided by the Victorian Institute of Plant Sciences at Toolangi.

In this and *future editions of 'Potato* Australia' a *major potato district will be featured. This edition looks at the Riverina district of NSW.*

The RIVERINA District

STEPHEN WADE is the District Horticulturist with NSW Agriculture at Finley in the southern Riverina.

Since the early 1960's there has been a shift in New South Wales potato production from the tableland areas to the Riverina district.

The sandy soils of the Riverina were suited to producing clean, white potatoes for the premium winter market. A warm climate also allowed two crops a year to be grown.

As a result the Riverina district now grows 60 percent of New South Wales potatoes.

RIVERINA PRODUCTION

The Riverina district grows potatoes for the fresh and processing markets. Total production is about 100,000 tonnes of potatoes a yearr.

The Spring crop is sown in July and August for harvest from November to January. Sebago is the main fresh market variety. It has a smooth, white skin and white flesh. Red Pontiac (fresh market), Atlantic (crisping) and Shepodie (french fry) are also grown. Yields for the Spring crop average 30 tonnes a hectare.

John Harris (right), the first person to grow two potato crops a year in the Riverina.

Small, round seed from the Spring crop is kept for sowing the Autumn crop. This crop is the main fresh market crop. It is planted during February and March and harvested from June to October. Autumn crop yields average 20 tonnes a hectare.

SANDY SOILS

The deep, friable, sandy soils of the Riverina provide the district with one of its chief marketing advantages—clean, white potatoes for the premium winter market.

Most of the sands are windblown deposits on old watercourses. Clay content of the sandy soils is very low at about five percent. Depth of the sand depends on the dune, but it is generally between 1 to 10 metres.

The friable soil structure of the sands allows easy cultivation and good development of tubers. A low clay content keeps the skins of potatoes relatively clean. Growers can also store potatoes in the well-drained sands during winter with very little rotting. Because of their good drainage, harvesting on the sands can continue during wet weather, enabling the district to maintain its reputation as a reliable supplier of potatoes.

SAND MANAGEMENT

However the sandy soils do have their management problems.

The low clay content of these soils mean they have:

- low water holding capacity,
- poor nutrient absorption, and
- a rapid decline in soil pH after cropping.

Soil pH can fall from 6.5 to 4.5 after three crops of potatoes. The sand dunes are also prone to wind erosion. To overcome these problems, growers:

- irrigate frequently (up to 30 times a year),
- use high rates of fertiliser,
- regularly lime paddocks, and
- plant cover crops.

A typical fertiliser program would include 20 bags Complete 3:2:1, 8 bags Calcium Ammonium Nitrate (CAN), 3 bags Muriate of Potash and 2 bags Urea per hectare. About 2 tonnes per hectare of lime is applied every few years.

CLIMATE

The warm, dry climate of the Riverina provides the district with a long growing season. Potato yields, however, are limited by high summer temperatures and a short Autumn crop growing period.

Maximum temperatures during summer are often 35° to 40°C. In contrast winters are relatively mild with average minimum temperatures of 3° to 5°C. Annual rainfall in the Riverina is 400mm a year. Evaporation is 1700 mm a year—four times the annual rainfall. The frost-free growing season for the district is about 270 days a year.

VARIETIES

To grow two crops in a growing season of 270 days, quick varieties are

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- **1993 seed buyers directory**
- **Information on that unusual variety**
- **Seed Pieces newsletter**

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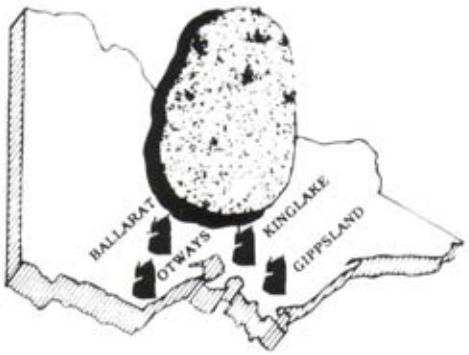

Victorian Certified Seed Potato Growers Committee Inc.

Victorian Certified Seed Potato Growers Committee
PO Box 571
Warragul
Victoria 3820
Telephone:018 514 581
Facsmilie: 056 234 596

required. Sebago, the main variety grown, has a growing period of 120 days and a seed dormancy of 42 days. However, even with Sebago, Autumn crop yield potential is reduced as the growing period is usually too short (90 to 110 days) for crops to fully develop before frosts occur.

DISEASE

High summer temperatures cause establishment problems in the Autumn crop. Soil temperatures often reach 38°C around the seed. Pre-irrigation of paddocks is necessary to cool down soil temperatures before crops can be sown.

Under these conditions seed breakdown is a major problem. Seed tuber breakdown by Bacterial Soft Rot *(Erwinia chrysanthemi)* often causes poor establishment. Planting whole, round seed and not irrigation crops until after emergence reduces seed breakdown losses.

Other disease problems in the district include Rhizoctonia *(Rhizoctonia solani),* Target Spot *(Alternaria solani)* and Sclerotinia *(Sclerotinia sclerotiorum).*

IRRIGATION

With the dry climate of the Riverina district, crops are irrigated every 3 to 6 days. Daily irrigation is often required to achieve maximum yields. Irrigation is by centre pivot, travelling roto-booms, water cannons and solid set sprinklers.

RIVERINA HISTORY

Double cropping of potatoes in the Riverina district was started by John Harris. In 1953 John grew the first Spring and Autumn crops near Finley. John's idea was to produce, during winter, a clean washed potato for the pre-packer market when no other areas were digging. He achieved success on the local and Melbourne markets.

Since then the area of potatoes has increased from 82 hectares in 1960 to 5,000 hectares in 1992. Expansion of production occurred in the district because:

- its sandy soils could reliably produce clean, white potatoes for the premium winter market
- Large capacity planters, mechanical harvesters and high volume moveable irrigators were developed,
- Large areas of cheap land with plentiful supplies of irrigation water were available, and
- It was within a day's drive of the Adelaide, Melbourne, Canberra and Sydney markets.

A "dam-a-dyka" being used by a Riverina grower to form mini-dams along crop furrows. This reduces water and nutrient run-off from the sandhills.

FUTURE

The future of potato production in the Riverina district will depend on the profitability of the industry.

In 1991 the average price received by Riverina growers for potatos was $150 a tonne, only one fifth the 1950 price of $780 a tonne. To maintain returns growers have increased growing areas. As a result Riverina growers have the largest average crop size per farm (88 hectares) of any potato growing district in Australia.

Future trends for the Riverina could include:

- further increase in crop size (although grower numbers may decline),
- year-round production of fresh potatoes (by planting a third crop in the middle of summer), and
- growing two processing crops a year (if cold tolerant crisping varieties can be developed).

Although times are difficult in the potato industry, while consumers require a reliable supply of clean, white potatoes from a central location, potato growing will continue in the Riverina.

The 7th National Potato Workshop

will be hosted by Tasmania and held at the Ulverstone Civic Centre in 1993. The Workshop will run from Tuesday, 25 May to Friday, 28 May inclusive and will consist of presentation of research papers, discussions of topics of industry relevance and a field excursion to the Tewkesbury Potato Station and surrounding districts.

The theme of the Workshop will be "The Competitive Edge Through Science" and contributors will be asked to address this theme in their presentations by highlighting the economic implications of their results.

The Workshop will also act as a forum for the States to discuss and co-ordinate future research that may be financially supported by industry levy and HRDC funding.

The organising committee are John Fennell (Chairman), Dianne Luttrell (Secretary), John Rich (Treasurer), Rowland Laurence (Program Director), Rod Dolbel, Lloyd Langham and Kevin Beams.

The Workshop has received excellent sponsorship. The major sponsors are ANZ Bank, CCA Snack Foods, Ciba-Geigy, EZ Fertilisers, ICI Crop Care, Tasmanian Vegetable Council, Westpac Banking. Other sponsorship has been received from Edgells, Hardi Irrigation, McCains, Rohm & Haas, Schering, Shell Chemical, Clements & Marshall, Crookwell Potatoes, ED Parsons.

A call for papers will be made in July and conference registration will commence in November this year. If you wish to attend this conference, to ensure you are on the mailing list please contact:

7th NATIONAL POTATO RESEARCH WORKSHOP
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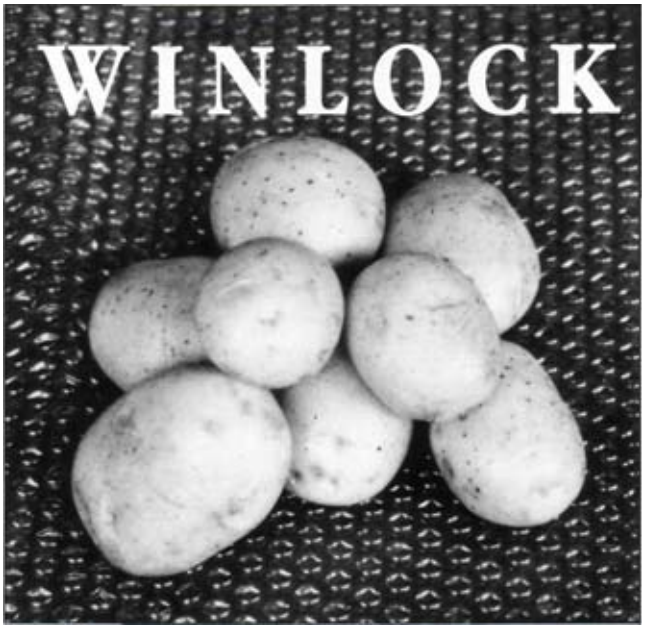

Ware grown & packed fresh

TONY PITT is an Executive Officer with the Victorian Certified Seed Potato Growers Committee at Warragul, Victoria. They are the licensee's for the Winlock variety.

After twelve months of full commercial assessment across Australia, Winlock has carved out a market niche as a high yielding and easily marketed potato variety. But, not all the experiences have been rewarding!

In this article, several growers from around Australia share their experiences with this new variety.

QUEENSLAND

Winlock was selected in the Lockyer Valley for winter production, but some of the best performances have come from much further north on the Atherton Tablelands. Nino Quadrio of Tolga had one of the best crops with an overall yield of 50 tonnes per hectare from an August planting. Nino believes that Winlock will normally yield 5 to 8 tonnes per hectare heavier than Sebago for most planting times. The skin colour was generally very good and the crop was washed and packed. February planting from saved seed was not as vigorous but this crop is yet to be harvested. Owen Johnson on the Upper Atherton Tablelands had lower yields and a performance similar to Sebago. However there was some susceptibility to internal brown fleck, and Owen is wary about high soil temperatures at top dieback, as he believes that this will promote the fleck. He intends to plant at a 350mm spacing next year, as tubers were a little small.

NEW SOUTH WALES

Brian Sheridan compared Winlock with Sebago near Coffs Harbour, in drought conditions and just one irrigation. Winlock yielded 40 tonne per hectare while the adjacent Sebago's produced only 15 tonne per hectare. The Winlock tubers were round, evenly sized and sold for packing. Brian observed brown fleck in two crops and is also wary about avoiding conditions where internal brown fleck may occur. He intends to plant at a slightly closer spacing next year (about 300mm) to try and produce a maximum number of 250 gram tubers.

SOUTH AUSTRALIA

Gordon Marks at Mannum had good yields but says the size was a little small. It matured a little later than anticipated. Despite being three weeks after haulm death, the tubers had held their bloom and were suitable for washing as pre-packs. Gordon felt that higher grades were possible if the harvest was better timed to haulm death and maximum tuber bloom. This coming season Gordon intends to push growth a little more to get optimum size. He was impressed by the evenness of the tuber size.

VICTORIA

Seed growers report excellent seed yields. However, some of the most interesting comments come from fresh market growers. Harvey Poole of Thorpdale obtained a yield of 61 bins from 4 bins of seed and had excellent feedback from his packer on the round and even tubers. He believes that the variety is extremely late in bulking and it is the late waterings that are important in obtaining the most from the crop. The packer preferred Winlock to Sebago and Harvey intends to plant 8 to 10 ha this coming season at a 250mm spacing. Other Victorian growers who planted in mid to late spring have reported good yields but tuber size a bit below expectations. Harvey's observations of the late watering for larger and even round tubers may have some merit. Sebago spacings of 200mm have not produced good results for Winlock which seems to require a wider spacing than this in Victoria.

CONCLUSION

Winlock is high yielding, has round and even tubers and usually out yields Sebago. Skin colour is not as good but it is capable of being washed out of certain soils, provided it is harvested with bloom. It has shown resilience to adverse growing conditions such as drought, hail damage, wind and cold temperature, and has given good yields despite these setbacks. It appears it will establish a considerable share of the fresh market over the next few seasons. Avoid conditions leading to internal brown fleck, and harvest to catch the bloom. Wider spacing, sidedressing and late watering are key components of management.

Seed sold in 1990 was 15 tonne, 1991 was 165 tonne and 1992 is anticipated to be around 650 tonne.

Winlock is a variety protected under the Plant Variety Rights Act.


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PRE-CUT SEED . . .

better yield in Tasmania

PETER JOLLY is a Vegetable Horticulturist and Keith Chapman a Senior Vegetable Horticulturist with the Department of Primary Industry, Fisheries & Energy, Devonport, Tasmania.

Potato production in Tasmania is mainly based on two cultivars for processing: *Russet Burbank* (64%) and *Kennebec* (31 %). Both cultivars produce large tubers. Russet Burbank is long and cylindrical, averaging 200g/tuber, while Kennebec is more rounded. As a result, seed potatoes of either cultivar are usually cut into "sets" of around 50g each.

Commonly, potatoes to be used as seed are dug in autumn and cool-stored or stored inland in cool districts. Seed potatoes are brought out of store in spring about a fortnight prior to the anticipated planting date, cut and dusted, and planted.

Cutting seed for a potato crop just before planting needs good timing and creates a rush on seed cutters. Both hand and machine cutting are used in Tasmania. Hand-cutting is slow and labour-intensive, but produces good blocky sets with few lacking eyes. Machine-cutting is much faster and less labour-intensive and with a good operator can produce comparable sets, although blind sets may be more common. Neither method will give good results if poor quality seed potatoes are used and if good hygiene is not practised.

If planting is delayed due to poor weather or machinery breakdown the seed already cut must be held—often in poor storage conditions. Seed breakdown can then occur, leading to misses in the crop.

If seed could be cut straight after harvest or during winter, carefully suberized and then put into cool storage until planting these problems could be reduced.

The United States Department of Agriculture (USDA) conducted extensive research from 1964 to 1972 on pre-cutting *Russet Burbank, Kennebec, Katahdin, Norchip* and *Sebago* potatoes. Certified seed potatoes were cut from 60 to 150 days before planting, treated with chemicals, and stored in bulk bins or pallet boxes until planted. The resulting stands and yields were equal to or greater than those obtained with fresh-cut seed.

The Victorian Department of Agriculture conducted pre-cutting experiments at the Potato Research Station, Healesville in 1976-78. Seed tubers of *Pontiac, Sebago, Coliban, Sequoia* and *Tasman* were cut and cured four months before planting. No breakdown occured in storage, germination was good and yield high.

A recent USDA project investigated pre-cutting of seed to overcome problems of delayed emergence, slow uneven development and reduced plant stands, frequently associated with the cultivars *Shepody* and *Yukon Gold* grown in Michigan. Pre-cut seed of both cultivars exhibited increased early vigour and increased plant stands compared to fresh cut seed. Pre-cut seed produced a significantly higher tuber yield compared to that of fresh cut seed.

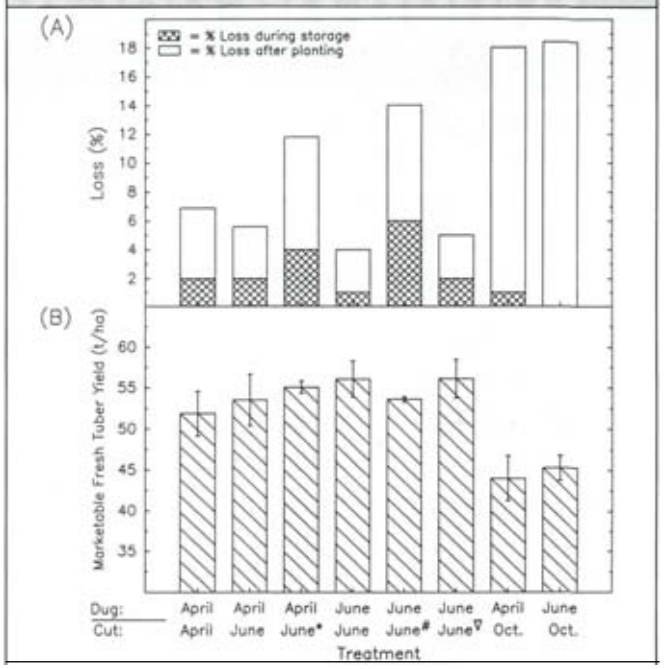
The Department of Primary Industry, Fisheries & Energy, Tasmania, in association with ABBMAC Rural Services and Langworthy Cool Stores, carried out a potato pre-cutting trial last season with two objectives:

(1) to determine whether seed can be cut early and then cool stored until required for planting without breakdown of sets.
(2) to determine whether pre-cutting of seed affects emergence, yield and quality.

Seed Russet Burbanks were machine-cut in April and June, dusted with cement and left to heal for a week before being put into cool storage. The treatments representing normal commercial practice were cut and dusted in October, a week prior to planting.

Some seed piece break-down occured in the pre-cut treatments during cool storage, on average 2% (Figure A), but 6% in a treatment which was not dusted and 4% in

The effect of time of digging and cutting on Russet Burbank seed piece loss (A) and marketable tuber yield (B). All cutting procedures were the same except for: * cut direct from coolstore without warming, # no cement dusting, and ▽ no bin vent.

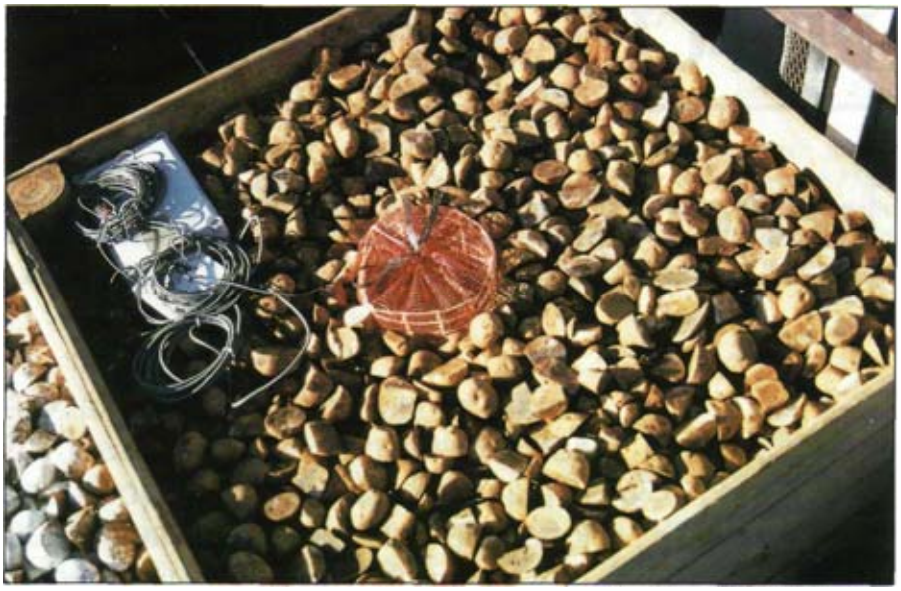


another cut direct from the coolstore without prewarming.

However, the pre-cut, coolstored seed had significantly less breakdown after planting than seed cut a week prior to planting. Breakdown in pre-cut treatments after planting ranged from 3% to 5%, but near 8% in the undusted and 'cold-cut' treatments.
Seed cut in October showed 18% breakdown after planting.

Relatively high levels of set breakdown after planting occurred in many crops through the 1990-91 season. Consequently, the pre-cut seed provided a more even plant stand and resulted in less oversize and misshapen tubers.

The pre-cut treatments produced a significantly higher yield of processing tubers than seed cut a week prior to planting (Figure B). Pre-cutting had no effect on specific gravity, hollow heart or greening.



Machine-cut seed, not dusted, before going into container. Data logger recording RH, air/surface temperature at three levels in bin and free moisture. Central vent in bin aiding air distribution to cut sets.

POTENTIAL BENEFITS OF PRE-CUTTING SEED ARE:

- more time available to cut during winter, avoiding a rush before planting.
- cut seed easier to hold out of store if planting is delayed, because it is well-suberised.
- less breakdown after planting, providing a more even plant stand.
- higher yield compared to the crop from freshly-cut seed.

The DPIFE is conducting another trial this season (1991-92) in association with ABBMAC Rural Services, to determine if different seed dusts and/or controlled conditions during suberization can reduce storage losses to nil.

REFERENCES: Leach, S.S., Hudson, D.E., Hunter, J.H., Johnston, E.F. & Wilson, J.B. (1975) "Precutting Seed Potatoes For Higher Quality Seed And Greater Returns". USDA, Marketing Research Report No. 1035.
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Bacterial Soft Rot of potato.

Products to control seed piece decay: PRELIMINARY RESULTS

DRS CHRIS WILLIAMS and TREVOR WICKS
are Senior Research Officers with the Department of Agriculture, South Australia. They are based at Lenswood and Northfield, respectively.

The problem

Over seventy percent of the 38,000 hectares of potatoes planted annually in Australia are grown from cut tuber seed pieces. Decayed seed pieces reduce plant emergence and yield, especially where high temperatures and rain occur soon after planting. Extra costs are involved when replanting is necessary. Also significant tuber seed losses can occur during storage pre-planting.

Growers often dust tubers with a range of chemicals straight after cutting to reduce loss, but the efficacy of many of these materials is unknown.

Experiments were undertaken to develop strategies of reduced chemical usage and to use effective natural products for the control of *Erwinia spp* bacteria the main casual pathogens of seed piece decay.

Preliminary results

A laboratory screening procedure has been successfully developed to screen a wide range of materials. This involved dusting or dipping freshly cut seed pieces of the cultivar Atlantic with the test material. Seed pieces were then sprayed with a suspension of *Erwinia carotovora* subsp. *carotovora (Ecc)* then incubated at 100 percent relative humidity in sealed plastic bags. The severity of rotting was assessed after 48 hours incubation at 20°C.

The best treatments in laboratory trials were either cement (2 g/kg of cut tubers), hydrated lime (2 and 5 g/kg) or mancozeb (800 g/kg product at 2 and 4 g/kg of cut tubers). Copper chelate, chlorothalonil, pencycuron, gypsum, Douglas fir bark mixed with talc (30:70) and Radiata pine bark were not effective. Although Douglas fir bark (applied at 10 g/kg of cut tubers) significantly reduced decay compared to untreated pieces, it was not as effective as cement, lime or mancozeb.

In a further experiment dipping cut tubers in a 0.5 or 1% solution of *Streptomycin* significantly reduced decay, whereas a 1% solution of potassium permanganate was not effective.

Further testing of the most effective chemicals is in progress in field conditions as **this is needed before** they can be recommended for commercial use.

Preliminary field trial results show cement and lime to be ineffective if rain falls and maintains the soil at field capacity for 4 to 10 days after planting. On the other hand, the 80% active ingredient of Mancozeb (applied at 2 g/kg of cut tubers) effectively controlled seed piece decay under the above field conditions. However, the 20% active ingredient formulation of Mancozeb at the same rate was less effective in the control of seed piece decay.

Further work is planned to determine if seed piece decay can be controlled by appling chemicals, curing cut seed pieces and managing soil moisture levels at sowing.

WE ACKNOWLEDGE THE FINANCIAL ASSISTANCE PROVIDED FROM THE HORTICULTURAL RESEARCH AND DEVELOPMENT CORPORATION AND THE S.A. POTATO INDUSTRY TRUST FUND COMMITTEE.

Common scab research update: 1991-92

LOIS RANSOM
is a Plant Pathologist with the Department of Primary Industries, Food and Energy (DPIFE) in Tasmania.

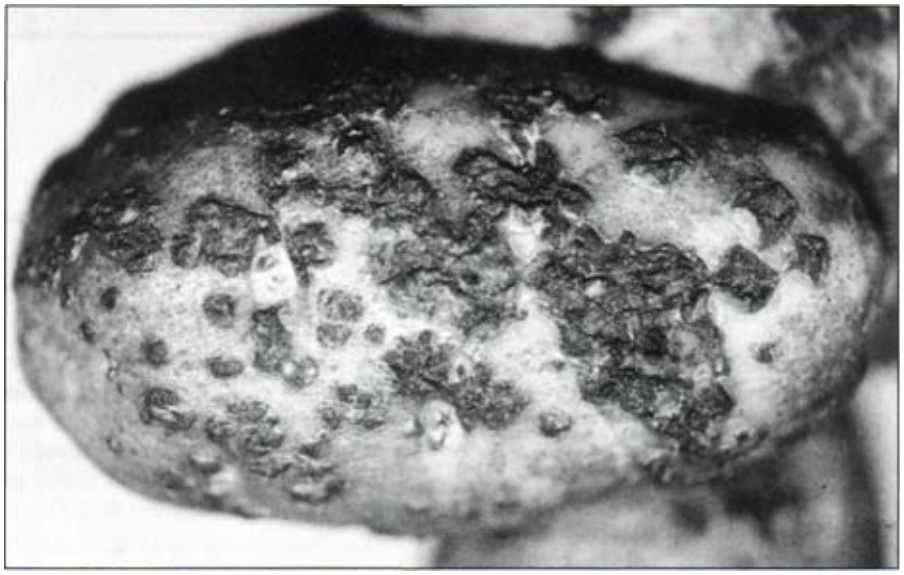
Since 1990 the DPIFE in Tasmania has pursued a two-pronged attack on common scab of the Russet Burbank potato. With losses to the disease estimated at close to $1 million and rising with each harvest, scab continues to be a research priority with the potato industry.

Losses occur through rejection of tubers from seed and processing ware crops. Deep-pitted scabs on tubers cannot be removed by conventional shallow peeling chipping processes which results in high levels of waste and quality control input while infected tubers are unsuitable for seed.

During 1990-91, an industry funded joint project with the Horticultural Research and Development Corporation investigated a number of rapid identification procedures for the scab organism. The aim being that a quick soil test would identify the levels of the scab pathogen present before planting the next potato crop. A number of tests including DNA probes and ELISA were developed, with ELISA showing the most promise to date. Antiserum to four pathogenic isolates was generated and showed good sensitivity for the pathogen in known infested soils against a non-infested control. However, further funding is required to develop test boundaries for sensitivity and selectivity for scab in cropping soils. A proposal has been put forward to HRDC for this work.

In moving towards management of disease, a number of fungicides were evaluated last season, and again this season, for their efficacy against seed and soil-borne infection respectively. Results of trials were presented at the 8th Australasian Plant Pathology Conference, Sydney last October. Briefly, we found that two new fungicides (ICIA0192, CGA142705) and the seed dressing mancozeb (Tatodust®) reduced the incidence and severity of common scab from diseased seed. Treatment with the commonly used seed dressing, cement, did not reduce scab. We concluded that treatment with mancozeb would help break the disease cycle from infected seed and reduce levels of soil infection and disease in subsequent potato crops.

This season's crop is yet to be harvested so we have no further



A potato tuber heavily infected with Common Scab.

FIGURE 1: Potato crop infection in 1990-91 resulting from replanting scab-free seed into plots sown with infected seed in 1989-90.

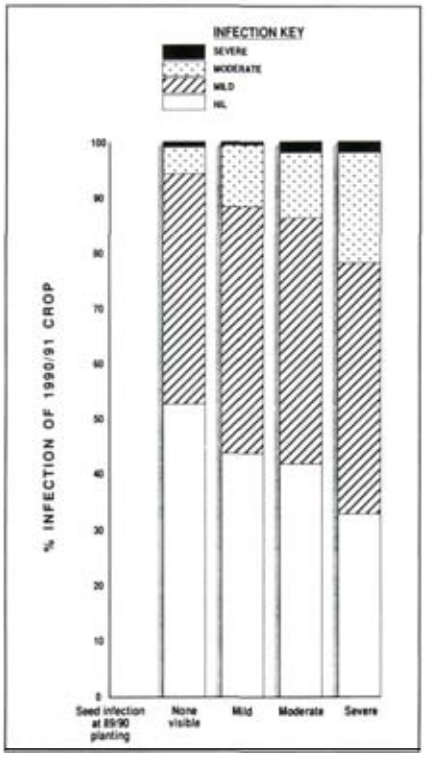
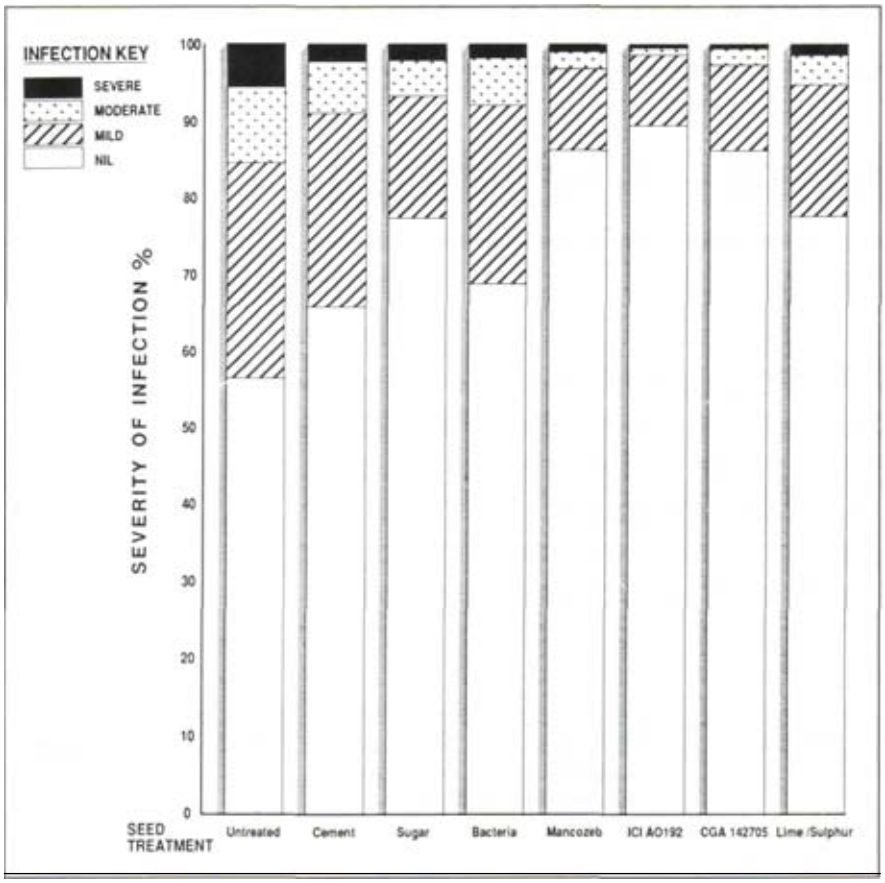


FIGURE 2: The effect of various seed potato treatments on the incidence of common scab.



information on fungicide efficacy against soil-borne inoculum or the susceptibility to scab of the 30 cultivars being assessed. This information should be available by the end of June 1992.

In conjunction with our research, we have been questioning potato growers with scab affected crops, to form a picture of their crop management practices and hopefully pick up some common factors in development of disease. A few trends are beginning to emerge although it is still early days. We have found that many growers believe the first irrigation at tuber initiation may have been a little late but that watering was generally adequate. Most growers used cement seed dressings and farmed soils with pH ranges of 5.3 to 6.5. Many had also used lime in the past. There is a strong link to previous scab infection and several to the previous use of scabby seed.

Research and development in disease management is ongoing but it may be some time before significant progress is made.

GRAPHS: REPRINTED FROM VEGETABLE AND ALLIED CROPS ANNUAL REPORT, 1990-91, DPI, TASMANIA

GENETICALLY ENGINEERED POTATOES

The CSIRO Division of Plant Industry potato team-creators of Australia's first genetically engineered plant approved for release into the environment. From left: Dr Peter Waterhouse, Dr Paul Keese, Ms Rosemary Holliday, Ms Jennifer Howe and Dr Wayne Gerlach.

PETER WATERHOUSE is a Senior Research Scientist, CSIRO Plant Industry in Canberra.
KEN JACKSON is a Senior Agronomist and ALAN DUFF a Temporary Experimentalist at the Gatton Research Station in Queensland.

The CSIRO Division of Plant Industry field tested Australia's first genetically engineered potato plants in conjunction with the Queensland Department of Primary Industries at Gatton Research Station in the Lockyer Valley in 1991. The genetic make-up of the two varieties Atlantic and Kennebec has been modified so that they are resistant to the potato leaf roll virus (PLRV). The CSIRO program to develop this resistance to PLRV is a collaborative one with Coca Cola Amatil and State Departments of Agriculture. PLRV, an aphid transmitted virus, reduces productivity in Australian potato crops. In Queensland severe outbreaks can show 100 percent of plants infected resulting in up to 50 percent yield loss.

The field test was carried out in a quarantine area on Gatton Research Station following approval from the Commonwealth Government's Genetic Manipulation Advisory Committee (GMAC) to field test the plants. In the field test, transgenic plants (plants transformed with T-DNA containing a synthetic resistance gene which encodes the coat protein of the virus) of Atlantic and Kennebec varieties were compared to non-transgenic plants of the same varieties. The aim of the trial was to assess whether, under normal potato growing management, the transformed plants would behave true to type. This management included spraying with aphicides to control the aphid vector and thus reduce the incidence of PLRV. Therefore, no attempt was made in this trial to measure the effect of the transgene on protecting the plants from disease due to PLRV.

Results demonstrated that the insertion of the transgenes had no deleterious effect on the plants when monitored for emergence date, growth habit, flowering time, tuber yield (size and weight), tuber dry matter and tuber cooking quality.

Survey of potato pests and diseases in South Australia

TREVOR WICKS is a Plant Pathologist with SA Department of Agriculture at Northfield Research Laboratories.

A survey of Potato Growers was undertaken in late 1991 to determine the relative importance of the major insect pests and diseases in South Australia. The other aim was to determine the pesticides used to control the major pests and diseases as well as their frequency of use.

The overriding purpose of this exercise was to identify areas of future research needs and in particular where these relate to integrated pest management.

To collect this data a postal survey was sent to all potato growers in South Australia for whom addresses could be obtained. Growers were asked to rate pests and disease problems as either low, medium or high and to indicate the pesticides they used.

The survey was mailed to 251 potato growers (Table 1) and 42% of those that were still growing potatoes returned a reply. The survey data was then collated by Dr Helene Dillard, a vegetable pathologist working at the Northfield Research Laboratories while on three months sabbatical leave from New York State Experimental Station, Department of Plant Pathology, Geneva, New York. During this time Dr Dillard also conducted farm visits and interviewed 82 potato growers to validate the survey results.

A detailed report of the survey is being prepared and will be widely distributed in the potato industry.

There is considerable data on the importance of various pests and diseases in the main potato growing areas of South Australia and there is too much to be discussed in this article. However important findings were that target spot *(Alternaria solani)* and *Rhizoctonia* were the most important diseases on a state wide basis.

Bravo, Dithane and copper based fungicides were the main fungicides used and these were directed towards target spot control. Most growers made 5 to 6 fungicide applications per year whereas some did not apply them and others used more than 10 applications per year.

Aphids, potato moths and jassids/ leafhoppers were the main insect problem in South Australia and most growers used either Nitofol, Azodrin, or Rogor for control.

Overall this survey has given us some good leads as to where future research should be heading.

The widespread problem of target spot and the number of fungicide applications some growers are using to control the disease indicate that this is an area that warrants attention. No doubt target spot is of similar significance in other potato growing areas of Australia and it seems worthwhile to co-ordinate across States any future work on this and other programmes that lend themselves to an Integrated Pest Management Programme.

DISTRICT	Individuals receiving the survey	Individuals no longer growing potatoes	Respondents	Response %
Adelaide Hills	66	2	34	53
Adelaide Plains	45	5	15	38
Riverland/ Murraylands	48	6	15	36
South East	92	11	32	40
TOTAL	251	24	96	42

TABLE 1: South Australian Survey

Rhizoctonia (Stem) Rot of potatoes

Potato moth control in the 1990's

DR. PAUL HORNE
Institute of Plant Sciences, Department of Food and Agriculture, Burnley, Victoria.

Can potatoes be grown without using insecticides? For many growers, perhaps surprisingly, the answer is yes.

Sampling leaves for potato moth and its parasites.

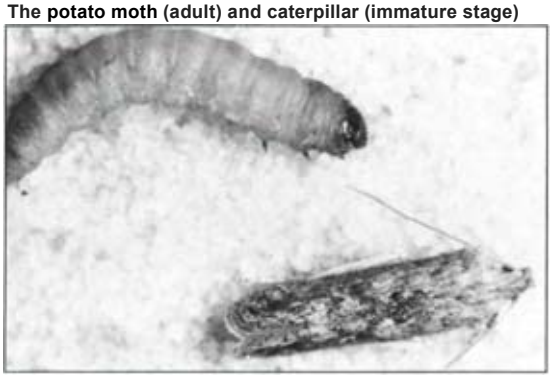
Potato Moth is a pest in most potato growing areas. At the Institute of Plant Sciences, Burnley, methods of potato moth control that eliminate the need to rely on insecticides have been developed.

Since the 1950's control of insect pests in potatoes, has relied on chemical insecticides. For many reasons, including user safety, residues in crops, effects on non-target organisms, environmental contamination and spray drift, alternatives to insecticides have been sought. However, to be commercially successful, the quality and yield from crops grown without insecticides must be equivalent to those grown conventionally. Methods developed and tested in Victoria have proven successful commercially at Thorpdale, KooWeeRup, Kinglake, Toolangi and Ballarat.

Keeping the potato moth under control is dependant on two factors; biological control agents (tiny wasp parasites) and cultural (management) methods. Neither on their own are really sufficient but together they make a highly effective combination.

This wide use of control measures, in a compatible way is called Integrated Pest Management or IPM.

The potato moth (adult) and caterpillar (immature stage)



IPM strategies are well established in orchards but until now, have not been developed for potato crops.

The wasp parasites of potato moth are less than a centimetre long and spend most of their lives inside the caterpillars of the potato moth. There are three species commonly attacking the potato moth in Australia. Different regions have differing relative abundances of each species, but there is at least one common species in all areas. For example, *Copidosoma* species are not abundant in southern Victoria but they are present. However, samples taken from Finley suggest that *Copidosoma* is dominant. The wasps seek out either the eggs or young caterpillars of the potato moth and lay their own eggs inside them. As the caterpillars grow, the wasps also develop inside them. Eventually, the wasps kill their caterpillar hosts and an adult wasp emerges to search for more moths.

It is normal for the potato moth to complete several generations in most growing seasons. As each female moth can produce over 100 eggs, the potato moth population can increase very rapidly if unchecked. The wasp parasites prevent the increase by replacing moths with wasps. Instead of a moth emerging to lay more eggs, a wasp emerges to kill more caterpillars.

Management techniques are equally as important as the biological control agents. Removing self-sown potato plants prevents the build-up of potato moth early in the season. Hilling and irrigation are important in maintaining a soil barrier between the tubers and the moth. Overhead irrigation and rain close up cracks that develop and protects tubers. It takes very little soil cover (less than a centimetre deep) to protect tubers, from moth.

Insecticides will kill the wasp parasites and so these two control measures are not compatible during the growing season. However, if the soil barrier cannot be maintained and insecticides must be used then they will be least damaging at the end of the season when the wasps should have had their main effect. In many situations, the hill can be maintained and insecticides will not be needed.

With insecticide-free control of potato moth available to many growers, the amount of insecticide used on potatoes can be significantly reduced. At Burnley, research is planned that will investigate mass-release of parasitic wasps as a type of "bio-insecticide". The aim is to produce enough wasps, released at the right time, to control the potato moth.

Moth numbers can be monitored using pheromone traps. These are baited traps that the male moths think are female moths. The number of moths caught in the traps shows when large numbers of potato moth eggs are likely to be laid, and so when hosts for the wasp parasites will be present. If laboratory-reared wasps were released at that time instead of using insecticides, it would add to the existing control given by natural populations and reduce any lag between moth and wasp build-up.

Work on non-chemical control of other pests, is under way at Burnley. If the IPM approach can be extended, Australia will not have to rely on insecticides to control major insect pests.

Forage Sorghum provides the answer

JOHN KILPATRICK
is a Senior District Adviser with the Department of Primary Industries at Kairi, Queensland.

The deep and free draining red basalt soils of the Atherton Tableland potato growing areas are poorly structured and low in organic matter if they are continually cropped. The tropical climate soon "uses up" any available organic matter.

Unfortunately, due to small farm sizes and economic constraints, many farmers find it necessary to crop each year. Pasture breaks are difficult to have in the rotation.

Traditionally, the irrigated winter potatoes followed a summer rain grown peanut crop. However, over the last two or three seasons an increasing number of potato farmers are foregoing the income from their peanuts. Instead, they are planting a crop of forage sorghum on the land earmarked for potatoes.

There are many benefits to be gained by adopting this practice, and the forage sorghum crop does very well during the hot, wet tropical summer.

A small seed drill is the best way to establish forage sorghum. Broadcasting is a fair alternative.

This crop is being cut for the second time. It is about 1.3 metres tall. The mower does a far better job than a slasher. However, a mulcher is also very suitable.

The clean cut from a sharp mower is shown here. Regrowth from this is quicker and more even that following a blunt slasher.

As one farmer commented, "If you cut your finger with a sharp knife it always heals quicker than belting it with a hammer!"

PLANTING AND FERTILISING

The forage sorghum is usually broadcast, but some growers have small seed drills available to do a better job.

Phosphorus is essential in the Tableland red soils, and nitrogen is needed for a crop such as forage sorghum. 125 kgs/ha of D.A.P. is a commonly used planting fertiliser. If lime or dolomite is needed to benefit the potato crop, it is best to apply it before the forage sorghum is sown. Nitrogen is also applied following each cut.

CUTTING OR MULCHING

If the summer weather cooperates, the first cut can be made less than six weeks after planting. A mulcher is excellent, but there are not many available on the Tableland. A clear cut from a sharp mower is better than a rough laceration from a slasher. Regrowth appears to be quicker and more even following a clear cut. By mowing, the green material lies in an even blanket. Slashing always leaves an uneven windrow effect that is not as effective.

The regrowth soon appears through the trash blanket and the sequence is started again. It is possible to make three cuts of the leafy sorghum before the final incorporation of the organic material.

PREPARING THE GROUND

There should be no remaining green material left in the soil when the potato seed is planted. The sorghum residues have to be managed with this aim in mind.

The common method is to rotavate the stubble and trash blanket. This is done deep enough to kill all sorghum plants. Ideally, a totally dead blanket should be on the surface for at least two weeks prior to planting. The longer the better, for this gives the sorghum residues longer to get to their best planting condition.

Obviously, other soil types in different climates and potato growing areas will need different methods of incorporation and preparation, but the final requirements will be the same for all districts.

WHAT BENEFITS ARE THERE?

The very rapid adoption by Tableland farmers of using forage sorghum prior to a potato crop is evidence enough that there are benefits to be enjoyed.

Some comments by satisfied farmers are worth repeating:

- *"The soil structure is obviously improved."*
- *"Good weed control is obtained during the wet season."*
- *"The soil has a better moisture holding capacity."*
- *"There is a break created in the white fringe weevil life cycle and there seems to be some affect on nematodes."*
- *Nutritional imbalances seem to be less obvious. The potato plants are a better and more even colour."*
- *"The improved soil conditions provide an easier and quicker harvest, and the spuds are a better shape."*
- *"I have no doubt it has improved my yields."*

There is no doubt that this proven technique will be used by Atherton Tableland Potato producers for a long time in the future. It could be well worth trying in other potato growing areas where it is difficult to maintain satisfactory levels of organic matter in the soil.

Papua New Guinea experts study in Warragul

FOUR POTATO INDUSTRY EXPERTS FROM PAPUA NEW GUINEA COMPLETED A NINE WEEK STUDY PROGRAM IN WARRAGUL DURING 1992.

The project was a joint initiative between VCAH McMillan, Department of Food and Agriculture and consulting firm Ag-Challenge.

Although based in Warragul, the Papua New Guineans visited other major potato producing areas of Thorpdale, Ballarat and Colac, and during March studied seed production in Tasmania and fresh market production in South Australia. They also consulted with seed certification officers from Ballarat and Toolangi.

Costs associated with the project were met by the Australian International Development Assistance Bureau.

The visitors were highly impressed with the ease of travel in this region, compared with the steep terrain and unmade roads of Papua New Guinea where such travel is normally by air.

During their stay, they worked in areas vital to the future of the industry in PNG. These include:

- identifying potato varieties suited to the PNG processing industry
- developing a certification scheme for PNG table potatoes
- developing a reliable system to multiply imported certified seed.

Papua New Guinea currently imports the bulk of its seed potatoes from Victorian sources.

The officers also studied at the Plant Research Institute at Burnley where mini-tubers are produced.

The Papua New Guineans enjoyed their stay in Warragul after coming to grips with the difference in cultures. They were surprised by the amount of meat in the Australian diet compared with their traditional diet based on sweet potatoes.

They were also surprised by the coolness of the Warragul summer and came unprepared. One of their first tasks was to purchase warmer clothes which were about one-third the price of that of Papua New Guinea.

Left to right: Bruce Kefford, Department of Food and Agriculture, Tony Pitt, Jim Caldwell, Beai Sub, Greg Liripu, Bob Gray, Kiagi Nema and Paul Siwie inspecting a seed crop at Jim Caldwell's property near Warragul.

Kennebec grown at 2200 metres at the foot of Mt Giluwe in the PNG highlands will eventually be processed in Port Moresby.

The Australian Vegetable Growing Handbook

Editor of the handbook, John Salvestrin, said the publication enables readers to answer many of the questions involved in selecting, growing and marketing commercial vegetables. It is an invaluable reference to all involved in the industry across Australia. Every endeavour has been made to ensure the publication is as concise as possible but accessible so that readers can obtain the information they need. The publication is available at a cost of $25.00 including postage from:

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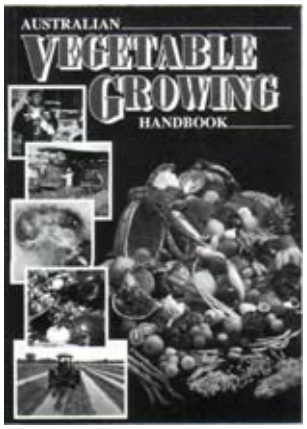


POTATO GROWERS GO BACK TO SCHOOL

FOLLOWING A THREE YEAR PROGRAM AIMED AT DEVELOPING AN IRRIGATION SCHEDULING METHOD FOR ATHERTON TABLELAND POTATO GROWERS, A POTATO IRRIGATION SCHOOL WAS ARRANGED FOR EARLY JUNE 1991.

Research Agronomist, Jim Gunton watches over potato farmers Steve Quadrio, Frank Trimarchi and Owen Jonsson, as they measure soil and water during a school practical session.

Organised by Senior District Adviser with the Queensland Department of Primary Industries, John Kilpatrick, the school consisted of short talks and practical demonstrations on a number of important topics.

These included:

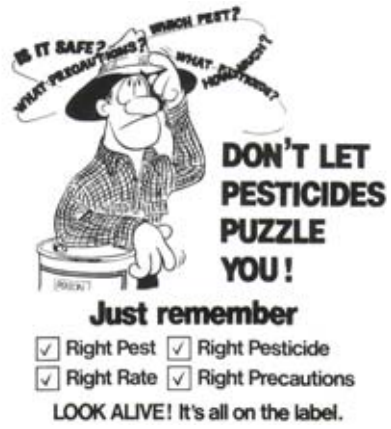
- The Four Stages of Potato Growth
- Soil/Water Technology
- Evapo-transpiration in the Potato Crop
- Checking Irrigation Efficiency
- Potato Irrigation Scheduling

Research Agronomist, Jim Gunton and Extension Officer, Lou Pregno helped with the "lectures".

Farmer students were given practical tasks to do in most topics, and all agreed that the afternoon was well spent and very educational.

The best possible result to the school was when a second one had to be arranged for mid-August. This was due to many requests from farmers who missed the first school and heard about it from those who had attended.

Similar meetings to discuss other potato topics are planned for the near future.



Managing Soil Fertility

ATHERTON TABLELANDS

JIM GUNTON is an Agronomist at Kairi Research Station with the Queensland Department of Primary Industries.

About 22,000 tonnes or 12 percent of Queenslands potato crop is produced by 80 growers in the Atherton Tablelands. The main variety grown is Sebago.

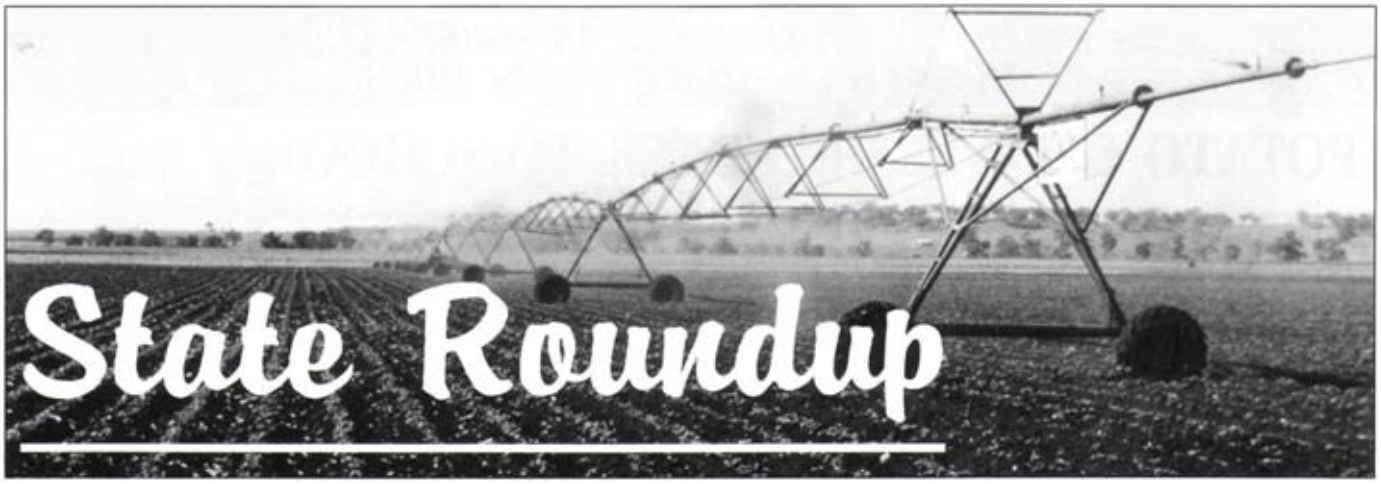
A major concern to these growers is the management of their soil fertility. A project recently commenced endeavours to determine what nutrients are required that are not normally found in potato fertiliser mixes and what the responses are.

While knowledge of the responses likely from varying amounts of nitrogen and phosphorus are well known, the responses of other elements used such as lime, magnesium, zinc and boron is relatively uncertain.

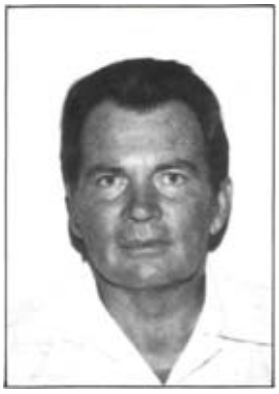
A total of 12 commercial sized sites on the Tablelands were chosen, where the responses to these nutrients are being screened.

The initial results are as follows:

- Potatoes did not increase their yield in response to the additional nutrients. There was a slight decrease in yield where lime was applied to a site that already had a high pH of 6.3.
- The specific gravity (S.G) of ware tubers was more sensitive to additional potassium, reducing the S.G with increased potassium. It indicates that farmers may be using excess potassium.
- Most crops were being oversupplied with nitrogen fertiliser (based on earlier work).
- Application of single elements may be causing an imbalance in soil fertility rather than correcting any deficiency.
- Local growers have been able to see these initial yield responses at harvest time. The interaction of all parties involved in the project has been largely responsible for the ongoing success. Those involved include QDPI, HRDC, the Atherton Potato Growers Co-operative, Incitec and Larkin Groundspread. Their assistance is gratefully acknowledged.



Queensland



JOHN KERR
is the District Adviser at Gatton with the Department of Primary Industries, Queensland.

South Queensland potato growers had a disappointing result from the 1991 winter crop.

Leaf roll and wind damage reduced yields by 25 percent. Prices throughout the harvest period were low and less seed than normal was saved for the 1992 autumn crop. This small planting was further reduced by excessive rain shortly after planting. Yields for this crop will be higher than last year but the overall production will be down at least 15 percent to around 25,000 tonnes.

Queensland winter crop plantings are now (May) estimated to be down at least 15 percent down on last years planting. The north Queensland planting will fall slightly but has been estimated to be around 1,000 ha. Plantings in the Lockyer Valley will on present seed orders be down at least 25 percent with other production areas not affected to the same extent.

Sebago still accounts for about 60-65 percent of the total planting but there has been increasing dissatisfaction with the level of disease susceptibility of this variety. The "Sebago leaf roll syndrome" in north Queensland has resulted this year in a 30 percent reduction in the area planted to Sebago being replaced with the variety Winlock.

In south Queensland growers claim the variety has shown increased susceptibility to disease as compared to Pontiac and Exton the other main varieties. There have also been problems with poor colour from the variety Pontaic when planted early. Several alternatives are being tested.

There has been good acceptance of the use of whole round seed both in north and south Queensland this year. With the rundown of soils in the main potato growing areas there is an increasing use of forage crops particularly forage sorghum as a pre-crop for potatoes. Growers in both north and south Queensland have found this a most beneficial rotation.

The processing industry in Queensland is still relatively small by southern standards and it is estimated that less than 20 percent of the crop is directed to this use. The bulk of this is for crisps with the variety Atlantic accounting for most of the production.

Western Australia

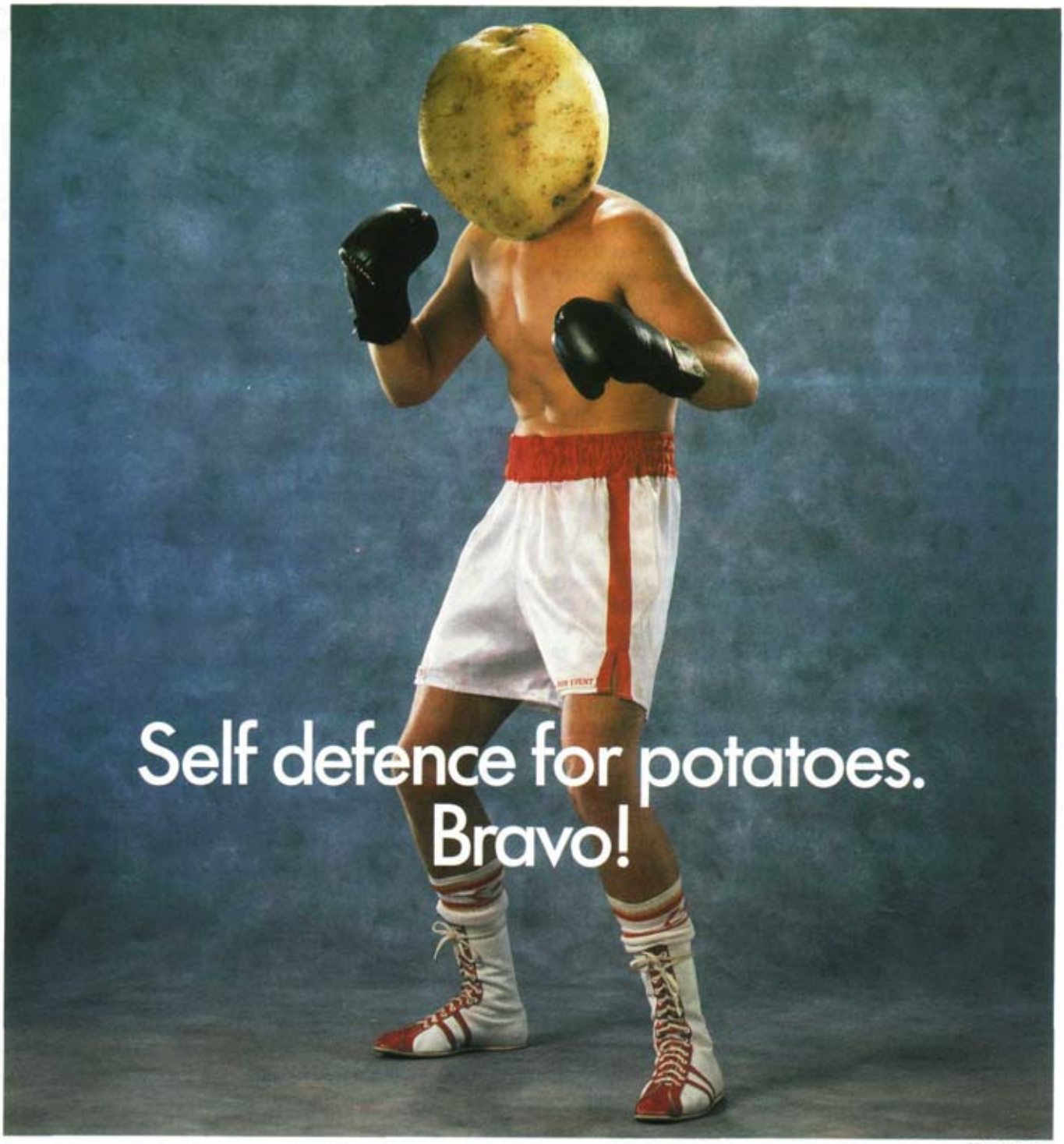
PETER DAWSON
is a Vegetable Adviser with the Department of Agriculture at Bunbury. Peter also runs the potato variety evaluation programme for Western Australia.

Last year I wrote that the current season would be more stable for WA growers. This prediction was correct for the fresh market but completely wrong for the French fry growers.

All up production is about 80,000 tonnes, a significant drop from last years production of nearly 100,000 tonnes.

FRENCH FRY: The major plant is run by Edgell Birds-Eye at Manjimup. Last season the plant processed 34,000 tonnes, 16,000 tonnes below capacity. This season started with uncertainty when growers were offered a base price of $178/tonne plus incentives. This is about $30/tonne below last years price. Signing of contracts only occurred after prolonged negotiations between Edgells and the French fry growers group. Consequently many crops were planted late. Only 20,000 tonnes will be produced this year. About 6,000 tonnes will be Kennebec, the early variety, and the balance will be Russet Burbank. Processing has commenced and some problems with low dry matter in Kennebec and sugar problems in Russet Burbank have occurred.

Explanations as to why these problems have occurred may be forthcoming from the intensive monitoring of crops by Dennis Phillips, Vegetable Adviser at Manjimup, and Edgells staff. This survey includes soil and tissue tests, plant density measurement as well as irrigation monitoring. Next season Edgells plan to process 30,000 tonnes with the price stable but changes to the incentives. It is also planned to reduce the



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number of growers, with an average production of 1,000 tonnes per enterprise to give 30 growers in total. Edgells will also introduce Total Quality Management to production at Manjimup to ensure high efficiency.

In two years it is planned to process 50,000 tonnes. Half of this production is for local consumption and the remainder destined for export markets which will have to be developed.

FRESH MARKET: The fresh market has lifted this year, both exports and prices are up. Production is stable at about 50,000 tonnes. Since the new year, exports to the eastern states and to South East Asia and Mauritius have reached 7,000 tonnes, or more than 10 percent of production. Local prices have improved and crops harvested from September to December received $390/tonne for No 1 grade.

No prizes for guessing the major variety, however the PMA is actively promoting the alternative varieties of Coliban and Sebago. Production of these varieties has been planned to ensure a steady supply.

This year the Potato Marketing Authority comes under review in accordance with sunset clauses in the legislation. The PMA enjoys support of the majority of potato growers who see more stable returns, compared with interstate producers, without a concomitant increase in the wholesale price of potatoes.

CRISPING: The major crisping plant is run by CCA Snack Foods. 11,000 tonnes are processed. The main variety is Atlantic and production of this variety is increasing at the expense of the storage variety Cadima. Two rival, smaller plants have opened this year and they will provide an alternative supply for some sections of the market.

SEED: The closure of the trade in Victorian potatoes due to the PCN outbreak has highlighted some problems with the WA seed supply. Production in the tradition seed area has declined. The coming season will see the introduction of a Certified seed scheme to run alongside the current Approved system. It is hoped that this scheme will provide WA growers with a wider choice of seed as well as provide expansion of seed production in some areas.

No predictions this year!

Victoria

KEITH BLACKMORE is the Senior Certification Officer (Potatoes) at the Institute of Plant Sciences, Toolangi with the Department of Agriculture and Rural Affairs, Victoria.

The detection of three further infestations of PCN at Gembrook and Rosebud and continuing low prices were the main concerns for Victorian growers.

The low prices will force some growers to leave the industry. These growers are likely to be growing potatoes on grey or "off red" soil types or have winter harvested ware crops.

Crop performance has varied between districts and with the time of planting.

In the Gippsland Hills early crops produced smaller samples and yields compared to the main plantings which had average to good yields.

At Ballarat the season was cooler than normal with above average rainfall in December and early January.

The seasonal conditions resulted in an increase of late blight. The threat of blight development remained for much of the season. Some crop yields of processing potatoes were down by 10 to 15 percent due to the cool windy season and late blight. Rhizoctonia continues to be a problem with Russet Burbank crops.

Seed yields from Certified crops were about average. Growers have paid more attention to cutting tops off to produce the tuber sizes the buyers require.

The Colac area growers south west of Melbourne supply potatoes for French fry and crisp processing, and for washing and packing. Whle the low price of fresh market potatoes has been a concern, the yield and quality of crops has been good.

In the Otway Ranges, Certified seed crops experienced cool conditions during growth with one very heavy fall of rain in late December which waterlogged a few areas of crop and delayed some planting. In general the crops have had a higher than normal tuber set with good seed yields.

The Colac-Otway area has about 40 potato growers:

—19 Certified seed growers
— 8 Crisping growers
— 6 McCains growers

Only a few growers rely solely on fresh market sales for their livelihood.

Geelong experienced another difficult year in 1991. A reduced area was planted. The very wet and windy weather severely affected the early planted crops. Total yields were about 7-8 t/ha with up to half being unsaleable chats. Later crops yielded 10-12 t/ha.

Seasonal conditions for 1992 have started well. The area planted is expected to be reduced compared to 1992. The quantity of Certified Sequoia seed coming into the district is down considerably.

In Koroit the area of potatoes was down at least one third on the previous year. It was a cool, dry season but yields were average to excellent. McCains purchase of Safries and their subsequent closure of the Millicent plant could virtually close that market for Koroit growers as potatoes cannot be processed at the Penola factory at present. PCN restrictions imposed by the South Australian Department of Agriculture prevent processing unless PCN soil testing is carried out on all crops grown in the Koroit area.

Kinglake also had a cooler season with heavy rain early. Yields from early harvested Certified crops have been very good. Kinglake has 16 registered Certified seed growers and two fresh market growers.

Koo Wee Rup—despite a reduced tonnage contracted to the crisping companies the area planted was similar to 1991. Crop yields of processing grade potatoes of the newer crisping varieties were higher than for the old "standard" Kennebec. Tarago produced some oversize tubers. A flight of spring aphids resulted in an increased level of Potato Leafrol virus in some crops. The main varieties are Atlantic, Denali, Tarago, Kennebec, Norchip and Snowchip.

The Gembrook area has about 33 families involved in producing fresh market potatoes. Coliban and Sebago are the main varieties with smaller quantities of Pontiac, Exton and Crystal also being grown. This season a similar area was sown to 1991. Average yields were up slightly on 1991.

New South Wales

STEPHEN WADE
is the District Horticulturist, Finley with NSW Agriculture

The 1991/92 season will be remembered for its low prices and slow harvests.

Around 180,000 tonnes of potatoes, worth $44 million, were produced on 7,200 hectares in New South Wales. The fresh market was oversupplied for most of the year, while processing and seed production remained stable. Returns for the fresh market were poor, with prices often falling below growers' costs of production.

FRESH MARKET: Potatoes are produced in three areas of New South Wales—the Riverina, the Coast and the Tablelands.

The Riverina district grows 5,000 hectares a year in spring, summer and autumn crops. Harvest of the 1991 autumn crop was very slow. Yields were average at 20 tonnes per hectare. Prices were very low, ranging from $70 to $90 a tonne. The fresh market was oversupplied from July. As a result digging did not finish until November, one month later than usual.

The spring crop had a cool start and a dry finish. Insects such as aphids were a problem on some farms. Crop yields were high at 30 tonnes per hectare. However prices dropped from $200 a tonne in November to $80 a tonne by late January.

A summer crop was planted in November for harvest in March and April. Summer crop yields were average at 20 tonnes per hectare, however prices remained low at $80 a tonne.

The Coastal areas grow 1,300 hectares a year in spring and autumn crops. Because of dry weather, many spring crops required irrigation before planting. Crops also suffered some wind damage. Spring crop yields were 30 tonnes per hectare. Prices averaged $8 to $12 per 50 kilogram bag ($160 to $240 a tonne). Autumn crop areas are the same as last year. With the low returns for potatoes many growers have diversified into growing other vegetable crops.

In the Tablelands one main summer crop of 900 hectares is grown each year. Planting is from October to December with harvest from March to September. Tableland weather was also dry this year. Yields for the summer crop are high at 35 tonnes per hectare.

Sebago is the main fresh market variety, accounting for 70 percent of the State's production. Other fresh market varieties grown include Red Pontiac, Desiree and Coliban.

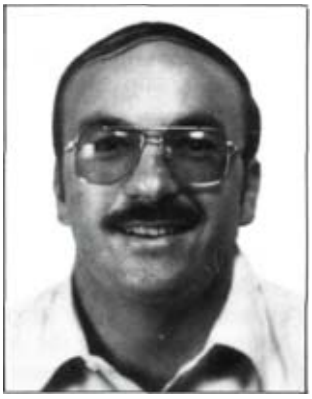
PROCESSING: Crisp production remained static during 1991/92. About 20,000 tonnes of potatoes were grown for Coca Cola Amatil, Frito-Lay Australia, Brahas and Kettle Fry. The supply of crisping potatoes was split between the three growing areas. Atlantic was the only variety accepted for contract crisp processing. Contract crisping prices ranged from $210 to $260 a tonne, depending on the time of delivery. Many growers achieved excellent quality bonuses during the year for very high dry matter percentages.

French fry production was stable over the year. Small processors and take-away shops increased demand on the open market. Around 5,000 tonnes were grown for french fry production. Shepodie was the main contract french fry variety. Contract french fry prices ranged from $160 to $200 a tonne, depending on the time of delivery.

Edgell's factory at Cowra, which canned whole potatoes, was closed in April.

SEED: Certified seed sales were slow. The 1991 autumn price for Crookwell Certified Seed was $360 a tonne. A shift to crisping varieties occurred as processing companies started buying seed for their contract growers. A Nil Tolerance for potato cyst nematode, powdery scab and bacterial wilt was required for Certified Seed in 1992.

South Australia



CHRIS WILLIAMS
is a Senior Research Officer specialising in potatoes at the Lenswood Horticultural Centre with the S.A. Department of Agriculture.

Potato production in South Australia for 1990/91 was 175,329 tonnes grown on 5,375 hectares with a gross value of $56.3 million (source ABS).

This represents a small increase in production and area sown (6 to 9 percent), but a decrease in crop value of 7 percent in 1990/91 compared to the previous year.

Half the South Australian potato crop is marketed fresh (of this over 70 percent is washed) and the remaining half is processed (mainly into frozen French fries, packet crisps or fresh chips).

Potatoes are grown in the four main vegetable growing areas of South Australia: Adelaide Plains, Adelaide Hills, Murraylands and the South East, either in rotation with other vegetable crops or as part of a cereal or grazing operation.

The Northern Adelaide Plains and Murraylands are the main regions for the production of washed potatoes for the fresh market. Coliban is a major white fleshed, washed variety grown with Sebago, Crystal, Exton and Sequoia also being produced. Pontiac and Bison are the major red skinned varieties grown.

The mild, wet winter and the mild summer conditions in 1991/92 have generally been associated with average to above average yields and reasonable tuber quality in all potato growing regions of S.A.

However, certain diseases were difficult to control given the unusually mild weather conditions. Target spot *Alternaria solani* was very difficult to control in most crops in 1991/92 in all areas.

1991/92 was one of the worst year's on record for the incidence of *Rhizoctonia* or black scurf, it occurred in a significant number of potato crops grown on the Adelaide Plains and Murraylands. This fungus disease was often associated with early dying of vine tops, often two weeks or more earlier than expected.

Prices for fresh potatoes although depressed in recent months have been satisfactory for the top of the range "premium" grade washed potatoes. Returns for the second

grade washed "specials", brushed and unwashed potatoes have been very depressed for many months.

There has been a significant reduction in production of potatoes for frozen French fries in the South East of S.A. due to a reduction in the contract requirements by processors in 1991/92. Also, certain crops are likely to remain unhar-vested for quite some time and damage may result (eg storage in wet soil after harvest maturity may reduce specific gravity and increase potato moth damage). The extent of such damage will largely depend on weather conditions in the weeks ahead.

Commercial crop at Balhannah, S.A. The best varieties produced total tuber yields of some 100 tonnes per hectare from small plots.

Moderate expansion of potato production has occurred in the Murray-lands. Most of this production is to supply the fresh, washed market. There is growing interest in supplying potatoes for crisping from Murraylands during the winter months.

The early sown summer crops in the Adelaide Hills of Atlantic for crisps often produced above average yields with too many oversize tubers (due to the mild summer conditions during tuber bulking). However, many late sown crops were severely affected by target spot disease which was very difficult to control (in the cool, wet autumn). This resulted in premature death of the tops and below average yields of small sized tubers being produced.

Tasmania

MAX WALKER
is the Principal Horticulturist (Vegetables & Allied Crops Branch) with the Department of Primary Industry, Fisheries and Energy in Tasmania.

The 1990-91 season was one of the most difficult that growers have experienced for many years.

Processors contracted for approximately 55,000t less than for the previous season with many growers having to accept contract cuts with partial compensation after having grown the crop to maturity.

McCains introduced a bruise free incentive scheme with encouraging results. Growers who achieved above their previous seasons bruise free average and the factories bruise free average were rewarded with higher prices for their crop.

Tuber shape for Russet Burbank was generally satisfactory and Hollow Heart was minimal. However, the incidence of Powdery and Common Scab was higher than the previous season.

Prices for ware potatoes were depressed early in the season due to an over supplied market but improved somewhat as the season progressed.

Total production including seed for 1990-91 was 235,465t, 62,025t less than the previous season.

Planting of processing crops for the 1991-92 season commenced in September and concluded in December.

A slight increase in production has occurred compared with last season and processing commenced on schedule.

Growers of processing crops have had to accept a reduction in price of some 16 percent for this seasons crop.

Growing conditions have not been as favourable as in recent years with temperatures being below normal. Heavy rain and very wet soil conditions have also been experienced in many districts and have caused harvesting disruptions and crop losses. Smaller tubers than normal from Russet Burbank crops in particular have also resulted in lower average yields in many innstances.

Seed crop yields are reported to be about average and harvesting is well advanced at the time of writing. Seed growers also expect to market all crops as local and interstate demand is most encouraging.

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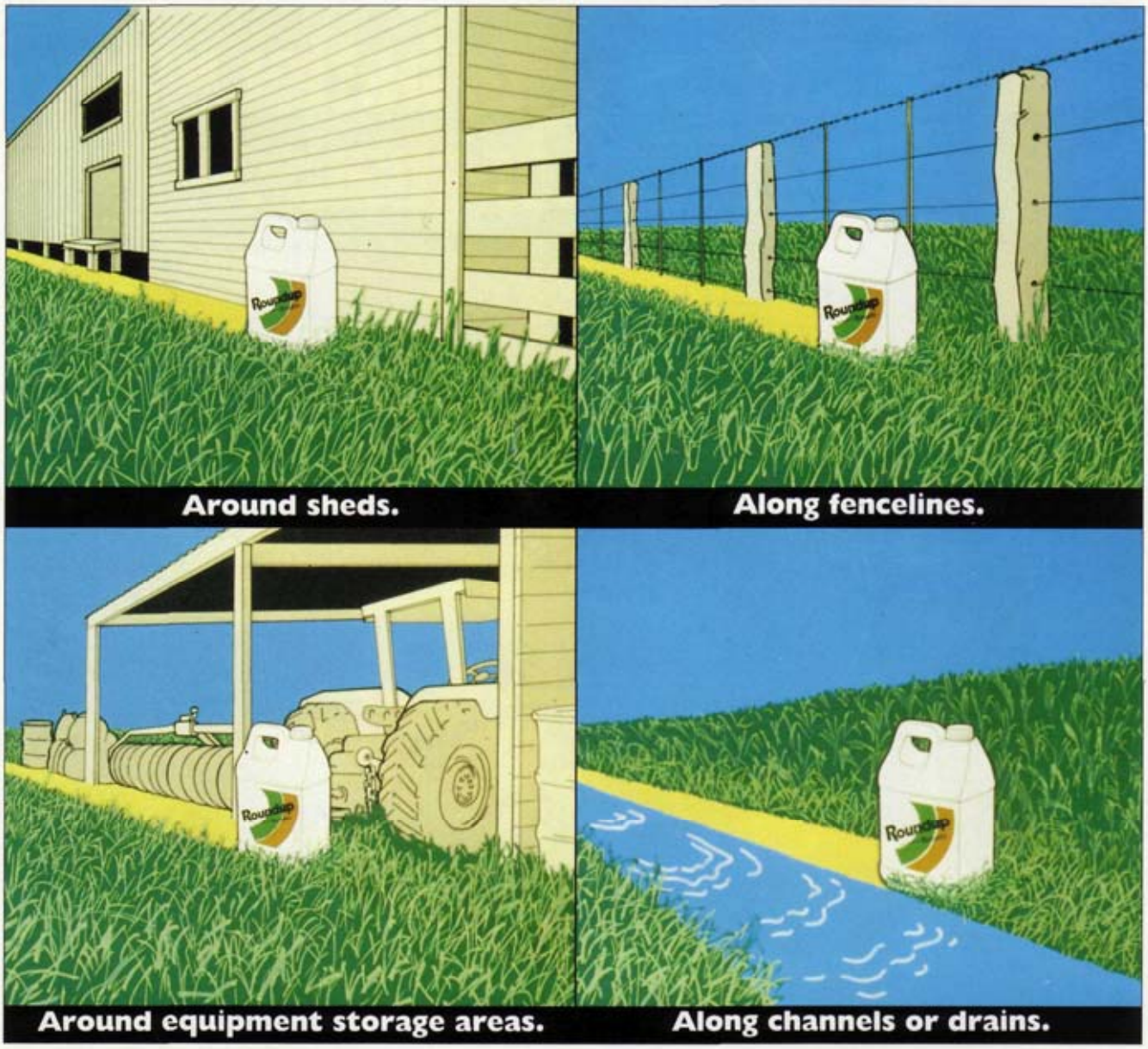

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